DEVELOP AND DEMONSTRATE A METHOD FOR CLASSIFYING HOME HEALTH PATIENTS TO PREDICT RESOURCE REQUIREMENTS AND TO MEASURE OUTCOMES

by

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EXECUTIVE SUMMARY

Overview

The major objective of the Georgetown University School of Nursing Home Health Care Classification research project was to develop a method to assess and classify the home health Medicare patients in order to predict their need for nursing and other home care services as well as measure outcomes of care. To accomplish this goal, data on actual resource use which could be objectively measured were used to predict resource requirements.

The research design was based on a conceptual framework which evolved from the statement of the problem, review of the literature, and results of an earlier pilot study. However, the methodological research was based on the assumption that by collecting a large volume of data on Medicare patients and resources used for their home health care, a classification method could be designed to predict care requirements. The research focused on five major conceptual issues: (a) assessment instrument, (b) resource use and requirements, (c) classification method, (d) outcome measures, and (e) applicability of the classification method.

A national sample of home health agencies, randomly stratified by staff size, type of ownership, and geographic location was selected. Of the 5,880 Medicare HCFA 1986 certified home health agencies 646 participated in the study. They were from every state in the nation and from Puerto Rico and the District of Columbia. The sample agencies each abstracted 5 to 50 Medicare patient records providing a total of 8,961 cases. The database assembled represents the largest compilation of pertinent information ever collected on home health agencies and patients.

Retrospective data were collected, using a specially designed Abstract Form, on each of the Medicare patient's entire episode of home health care from admission to discharge. Data on all relevant variables considered to be possible predictors of home health care were collected. The data included a wide range of variables: demographic, functional status, medical diagnoses, surgical procedures, nursing diagnoses/patient problems, nursing interventions/services, admission and discharge data, and data on the length of the episode of care and home visits made by various providers. Data were collected from all forms in the patient record and by questioning the primary nurse for data not found in the patient record.

The Abstract Forms were distributed to agencies who were responsible for the selection of the sample patients and for the abstracting of the patient's entire record. The Abstract Form consisted not only of single or multiple variable questions, but also narrative text. Two nursing care items -- nursing diagnoses and patient problems and nursing interventions -- were abstracted as textual statements of data recorded in the progress notes in the patient's record.

Since there was no agreement when the study began on which specific variables predicted home health visits, the data from the sample of 8,961 patient records were thoroughly examined to analyze the statistical significance of alternative classification methods. The descriptive analysis focused primarily on frequency distributions and means. Summary measures, measures of intensity, patterns of home health services and patient assessment relationships were conducted. The predictive analysis used linear regression and analysis of variance which were the most useful statistical tests. Predictions of resource requirements were made using two types of statistical models: regression models and categorical models.

The study products included descriptive findings on the universe of home health cases and predictive findings on the variables that measured resource requirements. Several schemes were also developed for coding nursing diagnoses and nursing interventions. Finally the study produced a three cohort model based on the length of the episode of care as an approach for a preliminary home health care classification method. The method, with further refinement, could form the basis for a prospective payment system for home health care.

The study findings can be grouped into four major areas:

- Descriptive findings on characteristics of home health agencies and patients;
- Predictive findings on the relationship between measures of resource use and predictors of resource requirements;
- Cohort findings based on length of the episode of care and number and type of home visits;
- Preliminary Home Health Classification Method.

Descriptive Findings

Home Health Agencies

The descriptive analysis revealed that home health care for Medicare patients is administered by certified home health agencies (HHAs) that vary by staff size and type of ownership, and are found in all geographic locations. The HHAs offer an array of home health services with the major service being skilled nursing care. Home health nurses not only assess, provide nursing care, teach, but also manage the care of patients provided by a mix of other approved providers, namely home health aides, physical therapists, occupational therapists, speech therapists and medical social workers.

Home Health Patients

The home health Medicare patients being served are predominantly elderly, white, middle class females, married or widowed, living in their own homes with an available caregiver. The vast majority (93.8%) of patients were 65 years of age and over, and more than half of these were at least 75 years old. Sixty percent were females, less than half were married and nearly half were widowed. Nearly one-third of the patients lived alone and over 25 percent were the primary care-givers thus essentially relying on self-care. The majority of the patients were oriented and were able to comprehend and communicate.

Three-fourths of all sample patients were new admissions who were referred to the home care program from acute care hospitals. Nearly half of the patients were under the care of the home health agency for 30 days or less, almost 30 percent between 30 and 60 days and all but one percent of the remaining patients between 60 days and one year. On the average, the patients received 11.9 nursing visits as compared to the 18.2 all providers visits which were weighted to reflect two-thirds of a home health aide visit because of their lower visit costs.

Patient Assessments and Services

The assessment of the home health patients and the services provided yielded other findings of interest. In general, the average patient was assessed as having an average of three nursing diagnoses and five different types of nursing interventions for the episode. These findings provided a new dimension on home health Medicare patient care. These classification variables were analyzed as predictors of resource requirements.

Finally, the data revealed that there were significant improvements in the health status of the patients from admission to discharge. Three-quarters of the patients were evaluated as improved, recovered, or stabilized on discharge. According to the primary nurse providers in the agencies, most patient goals were fully or at least partially met. The functional status ADL scores for patients showed a significant improvement in each of the functional areas. The study thus documents the efficacy of home health care.

Predictive Findings

Predictive Variables

The predictive analyses demonstrated that home health care can be predicted reliably and that a home health classification method is feasible. Five types of classification variables (independent variables) were considered to be the major predictors of resource requirements, and four variables were selected as measures of resource use (dependent variables). They were selected based on the preliminary analysis, a review of the literature and recommendations from home health nursing experts and researchers in the field. They were analyzed separately and in various combinations, regrouped and reanalyzed.

Classification Variables (Independent Variables)

The five types of classification variables (independent variables) were evaluated as predictors of resource requirements. The variables focused on the assessment of the patient's condition: functional status, nursing diagnoses including discharge status (improved, maintained, deteriorated), nursing interventions including type of action (assess, care, manage and teach), primary medical diagnosis or surgical procedure and on selected demographics. Although the actual discharge status was used it was a proxy for the expected outcome.

Measures of Resource Use (Dependent Variables)

The four measures of resource use (dependent variables) focused on the volume of home health visits by all providers, and length of the episode of care. The number of home visits were analyzed by each type of provider. They were regrouped into nursing visits only and visits by all providers which were weighted by deflating home health aide visits by a factor of .67.

The length of an episode of care was determined by counting the number of days between the first and last visit. They were also regrouped according to the number of visits made during the first thirty days, and during the total episode of care. These two groups were used in combination with the two types of provider visits.

Analysis of Classification Variables

Linear regression was used to compute a regression coefficient for each classification variable -- demographics, nursing diagnosis and nursing intervention components -- where a single case is a member of more than one group. Analysis of the variance (ANOVA) was used for functional status, medical diagnosis or surgical procedure, combinations of discharge status groups or combinations of nursing intervention types -- where a case is a member of only one group. Two other techniques -- stepwise regression and logistic regression -- were also examined but were found not to be useful.

The major findings were:

- **Demographics:** The demographic variables had little predictive power by themselves.
- **Functional Status:** The functional status variables had limited predictive power. Both the RUGs ADL and the GU ADL scores were the poorest of all the predictor variables, even though the GU ADL improved slightly when predicting weighted visits.
- **Nursing Diagnosis Components:** The twenty (20) nursing diagnosis components yielded the second best predictor of resource requirements for both nursing and all weighted provider visits for the first thirty days and for the total episode of care.
- **Nursing Intervention Components:** The twenty-two (22) nursing intervention components were a better predictor of nursing visits than all weighted provider visits for the first thirty days of the episode. Further, by combining them with the four types of nursing intervention actions, the best predictor of resource use was obtained for any of the classification (independent) variables.
- **Medical Diagnosis or Surgical Procedure:** The primary medical diagnosis or surgical procedure groups did not have high predictive power.

The analyses clearly demonstrated that, in general, the nursing visits for the first 30 days had the highest values for all the nursing assessment variables separately or in different combinations and had the most predictive power. On the other hand, the medical diagnoses and functional status variables did not have values of any significance.

Cohort Findings

The three cohort model emerged as another significant finding from the analysis of the visit data. The data suggested that there was not a simple linear relationship between visits and patient care requirements, but rather that there were different types of cases with similar episodes of care. The analysis focused on testing the differences between the three cohorts.

Since nearly half of the patients were under the care of the home health agency for 30 days or less, almost 30 percent between 30 and 60 days and all but one percent of the remaining patients between 60 days and one year. However, there was a distinct difference in resources used but the differences in nursing diagnoses and nursing interventions were small. The grouping into three cohorts -- under 30 days, 30 to 120 days, and over 120 days -- was arbitrary and based on clinical judgement. They reflected the natural clustering of the lengths of episodes of care and intensity of resources used.

The analysis of the three cohorts showed that during the first thirty days, five to seven nursing visits were provided on the average for the short term cases (under 30 days), whereas nine to fourteen visits were provided for the intermediate cases (30 to 120 days) as well as for the long term cases (over 120 days). These findings identified a significant difference between the short term, acute care cases of under thirty days and the intermediate, and long term cases of over thirty days.

These findings also demonstrated that home health visits could be predicted with a greater level of precision for cohort one than for cohorts two and three. Hence visits for both nursing and all providers (weighted) were considered to be predictable for the first thirty days with the existing data.

Preliminary Home Health Care Classification Method

Based on the study findings, a clinically sound and statistically significant Home Health Care Classification (HHCC) Method was developed. The HHCC Method includes a specially designed Assessment Instrument that encompasses the length of the episode which consists of three cohorts based on the length of the episode in days, and the nursing care requirements of the patient which consists of three levels of care for each of the three cohorts.

The nursing care requirements of patients for each of the three cohorts are based on seven types of assessment data for the twenty home health care components: (a) ten socio-demographic variables, (b) nine functional status variables, (c) 147 home health nursing diagnoses, (d) three measures of outcomes identified by three discharge status/goals (improved, stabilized, deteriorated), (e) 166 home health nursing discharge status goals, (d) twenty (20) nursing intervention home health care components, and (e) four types of nursing interventions. The twenty-two (22) nursing intervention components were restructured to match the twenty (20) home nursing diagnosis components.

These variables are used to assess and classify patients using the specially designed Assessment Instrument. The patients are assessed on admission to home health care, and reassessed at thirty or sixty day intervals and other predetermined times. The patients are scored and classified for three levels of care for each of the three types of cohorts. The regression coefficients are used to weight and score the patients and predict the average number of home visits.

This classification method could be used as a basis for a prospective reimbursement system for home health care Medicare patients and the scheme of twenty (20) home health care components used for reimbursement like DRGs in hospitals.

Conclusions

The descriptive analysis demonstrated that home health care is provided predominantly to a white, suburban, young-elderly population. Less advantaged and higher risk patients appear to be more likely to enter long term care facilities.

The best approach to predicting home health care use is based on a nursing model using nursing diagnoses and nursing interventions rather than functional status or medical diagnosis. Demographics have a relatively small impact on resource use and selected demographics can be used to improve predictions based on nursing diagnoses or nursing interventions.

Home health care cases can be classified into three cohorts based on the length and type of case in days. The number of visits in the first thirty days will be significantly lower for the short term cases than for the intermediate or long term cases regardless of nursing diagnoses or demographic characteristics.

The abstract form and coding schemes for the nursing diagnoses and nursing interventions including the groupings of home health care components developed for this study can be used as the basis for the Assessment Instrument and a preliminary Home Health Care Classification method. They can also be used for more efficient documentation and reporting of home health care for reimbursement and a prospective payment system.

Limitations of this Study

This study collected retrospective data on discharged patients for entire episodes of home health care. As a result many of the assumptions were not accurate and many of the data elements collected were not valid because of the varying nature of the home health agencies.

The limitations arise from the limits of retrospective data and the lessons learned from developing a preliminary classification method using summary data from a large national sample. Also, the lack of standardized coding schemes for the assessment variables and the inability to collect some variables such as visit time and cost added to its weaknesses.

The need for a prospective study to test and evaluate the assessment instrument and scoring methodology is essential to make a usable system. A prospective study would use prospective coding of the assessment variables and primarily the nursing assessment variables -- nursing diagnoses, expected outcomes, nursing interventions and type of interventions. They would be collected on initial assessment, for each cohort with periodic updates and detailed visit data. Periodic assessments must be made longitudinally to elucidate the differences between short term, intermediate, and long term cases.

Recommendations

Notwithstanding the limitations of this study, several recommendations clearly emerged from this research as well as other recommendations which addressed the need for further analysis on the study data and still others which identified the need for additional research. They included:

- The preliminary Home Health Care Classification (HHCC) method based on a nursing model, could predict resource requirements reliably, be clinically sound and statistically significant.

- The HHCC method could use an Assessment Instrument consisting of four factors that assess the patient care requirements needed to predict the resource requirements: (a) nursing assessment, (b) medical assessment, (c) functional assessment, and (d) socio-demographic assessment.

- The nursing assessment based on the 20 components of home health care could form the basis for predicting resource requirements. The variables -- nursing diagnoses, expected outcomes, nursing interventions and type of interventions -- could provide the framework for the nursing model.

- The HHCC method could predict resource requirements separately for each of three patient cohorts based on the type of case – short term, intermediate and long term – and based on expected length of the episodes of care. Different methods would be used to predict resource requirements for the first thirty days for each type of case as well as for the intermediate and long term cases for the rest of a case if and when the case exceeds 30 days.

- The schemes developed for coding nursing diagnoses, expected outcomes, nursing interventions and type of nursing interventions could not only enhance the patient record and the documentation of patient care but also, expand the existing HCFA coding scheme of nursing treatments used for completing the HCFA forms – 485 and 486.

- The HHCC based on a nursing model could predict resource requirements and used for reimbursement and/or a framework for a home health care prospective payment system. The level of reimbursement could be made using different fees for each of the three types of cases for the three cohorts. The highest level could be for the first 30 days of an episode adjusting for each of the three types of cases, followed by the next highest level for the second cohort and the smallest level for the third cohort.

- The study data collected could be linked to Medicare claims data on hospital and long term care episodes to enhance the understanding of resource use for home health care patients. Such analysis could also expand the existing information about the cost of home health care.

- Further analysis on the mix of skilled nursing and home health aide visits and on the home health aide visit alone in the first thirty days and total episode of care could show relationships between these two types of provider visits.

- Further analysis on nursing diagnoses and nursing interventions and their groupings of home health care components could determine the clusters of conditions and care requirements that relate to each other. Such analysis could show relationships between these two variables.

- A prospective research study based on the methods derived from this study could be carried out to refine, test and evaluate the preliminary Home Health Care Classification method and Assessment Instrument; to test the predictive models; and to generate additional data needed to elucidate the three cohort model.

- A prospective research study could include periodic patient assessments, data collection on nursing diagnoses, nursing interventions, and the expected outcomes (goals) of care for each home visit. The nursing assessment variables could be analyzed to determine the relationships between nursing diagnoses and nursing interventions and whether they provide a new type of case-mix algorithms.

- A prospective research study could also be expanded to investigate the services of other providers not studied in detail. The services include: physical therapy, speech therapy, occupational therapy, home health aide, and medical social services.

- A prospective research study could develop a prospective payment system for home health care which could improve the efficiency of home health care reimbursement as well as influence cost containment policy for the industry.

1. INTRODUCTION

This report describes the Georgetown University Home Health Classification (GUHHC) project conducted under a cooperative agreement between the Georgetown University School of Nursing and the Health Care Financing Administration (HCFA Cooperative Agreement # 17-C-98983/3-01). The major objective of the project, which began in 1987 and was conducted over a three and half year period, was to develop a method to assess and classify home health Medicare patients to determine their need for nursing and other home health services. It is anticipated that the findings of this project will contribute to the information base needed for future Medicare policy decisions concerning the home health industry.

Home health services have grown faster than any other segment of the health care industry in this country. Home health care refers to all services provided and products used to restore, maintain, and promote physical, mental, and emotional health to patients in their homes. The services are planned, coordinated, and made available by providers organized for the delivery of home care through the use of employed staff and/or contractual arrangements (Spradley and Dorsey, 1985).

The demand for home care services has expanded markedly as a result of the rising costs of hospital care, technological advances, and consumer preferences. In 1986 1.6 million people were receiving home care services (NAHC, 1986). The elderly population, the largest segment of home care clients, has been growing faster than any other population group. They have increased from 19.5 million in 1967 to 27.7 million in 1984 and it is estimated they will reach 50 million by the year 2010 (US Office of Technology Assessment, 1985). More of the elderly population are living longer (85 years of age) and will be using at least 25 percent of Medicare home care services by then (DHHS, 1988). Moreover, more than twice the number of elderly who receive formal home care services are estimated to have some limitation in their functional ability (Rowland 1989).

Federal reimbursement for home care services has been increasing since the passage of the Medicare legislation in 1965. In 1986 expenditures reached $2.6 billion (Rak, 1986). The annual compound rate of growth in Medicare reimbursements for home care services has been nearly 25% higher than for any other type of service except outpatient care. In addition, the adoption in 1983 of a prospective payment system (PPS) using diagnosis related groups (DRGs) as the method of hospital reimbursement for

Medicare beneficiaries resulted in early discharge of patients from hospitals. Many of these patients required further nursing services which were only available from home health agencies (Wood, 1984). Such services were viewed as alternatives to institutionalization and a means of containing health care costs. With increasing expenditures for home care services, attention was focused on the efficiency and effectiveness of these services.

Review of the literature on the home care industry clearly shows a lack of data about home health agencies and the services they provided (Berk and Bernstein, 1985; Wood, 1985/86). Moreover, there are no valid methodologies for assessing home health patients, classifying them according to resource requirements, or evaluating them according to professionally accepted outcomes. This research project was undertaken to address the gaps in methodologies for assessing and classifying home health services and measuring their outcomes.

2. BACKGROUND

Historical Perspective

Home health care as a community service in this country is not a new concept. In 1796 the Overseers of the Poor in Boston established the first home care program at the Boston Dispensary to care for the poor in their homes. In the early nineteenth century the visiting nurse movement began which provided care to the sick and indigent poor in their homes primarily in the crowded slum areas of large cities. In 1893, Lillian Wald established the first organized home nursing service, the Visiting Nurse Service of New York City. In 1909 she persuaded the Metropolitan Life Insurance Company to offer services to their policy holders in their homes (Mundinger, 1983). Thereafter, visiting nurse services and other types of home care agencies grew rapidly.

Federal involvement in home health primarily began with the Kerr-Mills legislation in 1961 (Public Law 86-778). Under its medical provision for the elderly, home care was linked to the Old Age Assistance program. In 1961 the Community Health Services and Facilities Act (Public Law 87-395) initiated the funding of grants to organizations for the development of outside-the-hospital health services.

Before the advent of Medicare in 1965, the majority of home care patients were chronically ill elderly persons whose greatest need for nursing care was the monitoring of their health status and supervision of their home care. Payment for such services came from private insurance, social welfare, or individual payment based on a sliding fee (Spradley and Dorsey, 1985).

Impact of Medicare Legislation

In 1965 the adoption of the Medicare legislation (Title XVIII of the Social Security Act, Public Law 89-97) with inclusion of home care benefits, greatly influenced the development and expansion of home health agencies (HHAs). The legislation required that HHAs certified for reimbursement of Medicare recipients provide not only nursing services but also at least one other service such as physical therapy, speech therapy, medical social work, or home health aide service. This regulation gave rise to today's multiservice HHAs. With Medicare a new era of home health services began. The reimbursement for services to patients, many of whom were previously unable to pay for their care, made expansion possible, not only in types of services provided, but also in the number of HHAs. Medicare's impact on what were traditionally non-medical home care services brought about a medical-based model of practice (Mundinger, 1983). Patients had to be under the care of physicians responsible for planning, reviewing, and certifying the medically directed services provided by nurses or other professionals.

Home health services have grown faster than any other segment of the health care industry. In 1963 only 55.6% of the population lived in areas where home care services were available; in 1979 such services became available to nearly the entire population (Survey of CHN, 1979). In 1986 about 6,000 HHAs were Medicare certified, representing nearly a five-fold increase from the 1,275 certified home health agencies (HHAs) of 1966.

The cost of home health care has increased steadily. In 1985 the average Medicare reimbursement for home care per visit was $45.00 compared to $8.00 in 1966 and $30.00 in 1979. However, the cost was considerably lower than the 1985 average Medicare hospital reimbursement of $435.00 per day or the 1984 average Medicare skilled nursing facility reimbursement of $62.00 per day (NAHC, 1986).

Influence of Diagnosis Related Groups

A major factor contributing to the increasing need for home health services was the passage of the 1983 Social Security Amendment (Public Law 98-21) which established a national Medicare prospective payment system (PPS) of reimbursement to hospitals which was based on the diagnosis related groups (DRGs). One of the major effects of DRGs on the health care industry has been that hospital patients are being discharged "quicker and sicker" (Wood, 1985/86). Seventy percent of the HHAs reported an increase in the numbers of patients served. The 75 to 84 year old patients showed the greatest increase followed by those 85 years and older.

PPS created strong incentives for acute care hospitals to decrease a Medicare patient's length of stay. In 1984 the average length of stay was 7.5 days compared to 9.5 days in 1983 (HCFA, 1985). Earlier discharges of patients from hospitals created a growing need in the home for more technical procedures such as intravenous therapy, catheter care, ventilator care, and other services requiring highly skilled nursing services (Wood, 1984). Patients requiring multiple visits per day and per week for these specialized services increased, resulting in more visits per case. This was substantiated by a study by Kornblatt and others (1985), which compared two home care agencies (one private and one public) serving the same population group. They found that after implementation of DRGs there was an increase in the frequency of visits and in the intensity of care.

Thus, changes in the home health industry occurred because of several interrelated factors that influenced the conduct of this research project. They were due to increases in: (a) Medicare-recipients over 65 years of age population; (b) elderly persons requiring some type of care to remain independent and avoid institutionalization; (c) earlier hospital discharge of patients in the acute convalescent, or rehabilitative phase of their illness; (d) types and intensity of services being offered in the home; (e) frequency of home care visits required; and (f) cost of home care visits.

Statement of the Problem

The Georgetown University Home Health Classification (GUHHC) research project addresses a major problem in the home health delivery system -- the lack of uniform and meaningful patient classification methods that predict resource requirements and measure patient outcomes. Resource requirements include variables such as intensity and provider mix of services; outcome measures include the factors that determine the appropriateness of terminating such services.

A major problem in the early 1980s with the home health payment system was its dependence on the interpretation by fiscal intermediaries of the Medicare guidelines developed by HCFA. Because of the ambiguities in terminology and policies, the lack of standard definitions among fiscal intermediaries affected the scope of services provided by agencies. For example, NAHC data demonstrated that the costs of a unit of service, whether measured by visit, time, or service, varied widely from agency to agency. Also, it was not possible to analyze services based on such factors as provider mix because of the inconsistencies in data provided by agencies (NAHC Report, 1986).

Traditionally, reimbursement systems and resource availability served as the basis for decision making in determining patient care requirements. However, as the demand increased, services paid by various reimbursement systems did not match the services needed by patients, nor did they adapt to changing needs. Further, as alternative reimbursement methods were being proposed for home care services, patient classification systems were being recognized as important management tools to translate patient needs into accurate measures for the allocation of resources. However, home health care does not lend itself to any simple uni-dimensional classification method because there is no valid and widely accepted method for designating a single construct to a case.

Several attempts have been made to develop alternative approaches for reimbursement; however, none were adopted by the federal government. Reimbursement was and continues to be accomplished by utilization review of patient records and 60-day certification of plans of treatment (Medicare HHA Manual, Transmittal Number 173, Sections 234.6 through 234.12, July 1985). The agencies are reimbursed on a cost-per-visit which is predetermined by the Medicare cost methodology with monthly billing using the HCFA Form 1450, also known as UB-82, (Medicare HHA Manual, Transmittal Number 181, 1986).

The need for useful and usable methodologies exists more strongly than ever since the demand for home care services and expenditures for these services continue to increase. Numerous Congressional hearings have been held on various aspects of home health services, including their costs and utilization, Medicare coverage and policies, and quality assurance. Research is essential to develop substantive information to support the needed policy changes.

3. REVIEW OF THE LITERATURE

Studies have attempted to measure patients' requirements for home care services, including outcome measures. However, most studies are incomplete and uncoordinated, and offer no definitive solutions to the problem. In addition, even though there are a few patient classification tools, none relates classification to resource requirements and/or outcomes measures.

A classification instrument is generally used to classify patients according to their requirements for care over a specified period of time (Giovannetti, 1979). The instruments that are described include those that assess and classify patients in hospitals and long term care facilities, as well as those being cared for in homes.

Most research on patient classification has been conducted in acute care settings in hospitals. Earlier studies focusing on the nursing needs of patients and the workloads they presented, were conducted by the Department of the Army and by the Division of Nursing, United States Public Health Service (USPHS).

The quantification of patient classification according to the use of nursing resources was developed by researchers at The Johns Hopkins University. Their studies influenced subsequent efforts to refine patient acuity classification scales such as linking process-oriented quality measurements to DRGs (Levine and Abdellah, 1984). These studies show that in many hospitals, staffing of nursing personnel is based on hours of nursing care required per patient per day as determined by classification methods that assess either the acuity levels of patients or calculate the time needed to provide specific nursing services.

Assessment Instruments

Since the implementation of Medicare, several instruments have been designed to assess the characteristics and needs of home care patients. They include the evaluation of the functional status, physical health, mental health, economic status, educational status, social resources, and ability to carry out activities of daily living (ADL). For example, the Patient Progress Methodology (Roberts and Hudson, 1964) which documented changes in the health status of community health nursing patients. Ancther example is the Community Health Systematic Nursing Assessment developed by Taylor and Johnson (1974) to collect data on the community health patient and family as a method of planning patient care.

An assessment instrument with implications for home care is Katz's Activities of Daily Living (ADL) index derived from observations of elderly people with chronic illnesses. It is one of the best known and extensively used scales to assess the actual performance in six functions fundamental to independent activities of daily living (ADLs). Katz's ADL index includes: (a) bathing, (b) dressing, (c) toileting, (d) transfer, (e) continence, and (f) feeding (Katz et al., 1963). Another function Katz used for assessment in the home is mobility (walking) which relates to the patient's ability to move around in or getting out of his/her residence (Katz, 1983).

The six functions were conceived in an hierarchical order to demonstrate the natural progression in both the loss and the return of these abilities. Loss of function begins with complex activities, e.g., bathing and dressing and progresses through the least complex, e.g., continence and feeding. Recovery, according to Katz, proceeds through three stages: recovery of independence in feeding and continence, subsequent recovery of transferring and toileting, and, lastly, independence in bathing and dressing.

Another assessment instrument with implications for home care is the instrumental activities of daily living (IADL). This concept developed by Lawton represents a more complex range of activities organized at a higher level of human behavior than those needed for personal self-care such as the ADLs. The IADL focuses on the person's ability to cope with the environment. The major adaptive behaviors include: (a) using the telephone, (b) shopping, (c) food preparation, (d) housekeeping, (e) laundry, (f) transportation, (g) responsibility for taking own medication, and (h) ability to handle own finances (Gallo, 1988; Kane and Kane 1981).

Several variations of measures similar to IADL have emerged. According to Kane and Kane (1981), IADL scaling suffers from the difficulty of conceptualizing normal independent functioning since these complex activities themselves can be broken up into sub-tasks. Because these tasks are complex, and the interpretation of the response equivocal, IADL is better measured through such constrained and simple tasks such as using the telephone. The interpretation of IADL results is also difficult since all persons do not need to manage skills at the same level of complexity.

The most critical assessment instruments for home health care were initiated in 1985 by HCFA. They consisted of three forms which had to be completed by certified HHAs for all Medicare patients requiring services (Medicare HHA Manual, Transmittal Number 173, Sections 234.6 through 234.12, July 1985). These forms were instituted by

HCFA as an attempt to standardize the recording of data needed for the certification and recertification of plans of treatment. The data are also used for the HHAs monthly billing for reimbursement of services by all providers using the UB-82 (HCFA Form 1450). The Initial three forms include:

- Home Health Certification and Plan of Treatment Form (HCFA Form 485).
- Medical Update and Patient Information Form (HCFA Form 486).
- Plan of Treatment/Medical Update and Patient Information Addendum Form (HCFA Form 487).

These forms (Appendix 3.1) collects an array of assessment variables such as functional limitations, activities permitted, plan of treatment, goals, etc. However, they do not include any of the instruments described in the literature.

Classification Instruments

In community health nursing agencies, staffing requirements of nursing personnel traditionally have been based on the size of the total population served and not on any specific classification method. Desirable staffing for public health nursing was recommended to be a ratio of one nurse to 5,000 individuals in the general population and one nurse to 2,500 for the care of the sick at home (Lukasik, 1981). However, when the Medicare legislation was introduced, these ratios were no longer considered appropriate in view of the need to increase the access to home care.

In 1978, the Western Interstate Commission on Higher Education in Nursing (WICHEN), convened a Panel of Experts who recommended a ratio of one nurse to 1,000 population be used for home health care (Lum and Leonard, 1978). Subsequent panels devised a formula for calculating staffing requirements based on the size and characteristics of the populations served. The formula included the percentage of hospital discharges as well as numbers and types of home health programs available from the different state and local agencies (Lukasik, 1981).

Patient classification efforts with direct implications for this research include those developed outside the hospital setting. In the early 1970s a classification method was designed for program planning and resource allocation of patients with chronic diseases in long term care settings (Jones, 1974). This was an attempt to provide a tool for improving the care of the chronically ill through systematizing the information base upon which the planners and providers of care make decisions. The multidimensional classification scheme addressed: (a) socio- demographic items, (b) functional status, (c) impairments, (d) medical risk factors, and (e) medically defined conditions.

In 1970 the Visiting Nurse Association (VNA) of Omaha, NE. developed a classification scheme for client problems in community health nursing. It provides a standard nomenclature for precise assessments, effective care planning, and recording of client/family problems. The scheme consists of 49 problem labels, each with a cluster of signs and symptoms. The problems are categorized in four domains: (a) environmental, (b) psychosocial, (c) physiological, and (d) health behaviors (Simmons, 1980).

Several other classification schemes for home health care nursing services have also been developed. The Easley-Storfjell Instrument for Caseload/Workload Analysis correlates patient care needs with workload measurements. Two instruments provide a summary of cases and workload and serve as a basis for case assignment and management (Saba and McCormick, 1986; Easley-Storfjell et al, 1979). Another instrument to classify patients receiving care in outpatient departments was developed by Horn (1985) by adapting her Severity of Illness Index.

Another classification instrument, the Resource Utilization Groups II (RUGs), consists of three ADLs and one feeding technique: (a) toileting, (b) eating, (c) transfer, and (d) parental tube feeding. These ADLs were most effective in explaining differences in resource use in a study of nursing home residents in New York State. They were chosen because they were statistically significant, less easily gamed, less affected by facility care, and provided incentives for quality of care. (Schneider et al, 1988).

Classification Studies

Several classification studies are relevant to this research. A study was conducted in nine Connecticut HHAs to determine which factors were most predictive of the quantity of nursing services utilized. This retrospective study of patient records found that the Health Status Score, which measured deficits in daily activities and nursing problems, was the best predictor (Ballard and McNamara, 1983).

Several studies conducted on the relationship between medical diagnoses and home health care revealed nothing of significance. According to Polick (1985), medical diagnoses did not predict the types and intensity of services required or the length of time those services were needed. Taylor's study of 56 Medicare certified HHAs in New Jersey concluded that medical diagnoses alone were not as reliable as medical diagnoses combined with age, functional status and severity of illness to predict service use (Taylor, 1988).

Several studies suggested that nursing diagnoses or patient problems are possible predictors of resource requirements. A nursing diagnosis is a statement that describes the human response of a patient which a nurse can legally identify and for which a nurse can order definitive nursing interventions (Carpenito, 1989). Hardy (1984) described a patient classification system for home health care using four nursing diagnoses (problems): (a) alterations in skin integrity, (b) respiratory dysfunction, (c) impaired mobility, and (d) impaired thought processes. This study suggested that a patient classification system could use nursing diagnoses and patient acuity to predict nursing needs.

Another study by Halloran and Kiley (1987) used nursing diagnoses to operationalize nursing dependency as an indicator of nursing resource use in an acute care hospital; the number of nursing diagnoses was primarily associated with allocation of time and effort spent by professional nurses with their patients.

Instruments to Measure Outcomes

Several attempts have been made to develop instruments for measuring the quality of home health services, including a variety of measurement approaches and methodologies that focus on the environment (structure), the actual care provided (process) and patients' responses to care (outcomes). While there are considerable interrelationships among these three dimensions, they are often assessed independently. Measurement of outcomes is considered an important dimension since it evaluates the effectiveness of services provided.

One example of measuring outcomes is the Sentinel Health Events (SHEs), a two-stage appraisal and follow-up of patients' care in extended care facilities. SHEs is simply a list of events (outcomes) such as decubiti or accidents that, when defined and weighted, can be used to evaluate the quality of care.

Another example is the Patient Classification System developed by Daubert (1979) which classifies patients into one of five groups according to their rehabilitation potential. All patients admitted to service are classified regardless of the number of medical diagnoses per patient or the mix of services required. Each of the five groups has been specifically defined to provide clarity and uniformity for assignment of patients to a group.

Another example is a prospective study documenting the care received by patients admitted to the Coordinated Care Program of the Massachusetts General Hospital and followed for their entire episode of illness including services provided in their homes. The aim of the study was to implement, evaluate, and facilitate clinical case management of community-based long term care of elderly clients including services in their homes (Zielstorff et al, 1986).

Still another approach to assessing outcomes emerged from the Omaha VNA's Classification Scheme for client problems. The scheme included the identification of the expected outcomes for each patient problem. It was envisioned that a patient problem could be measured by one of three expected outcome criterion measures: (a) prevention, (b) improvement, and (c) maintenance, and then compared to its actual outcome at a specified point in time (Simmons, 1980). The General Symptom Distress Scale developed by the Home Care Association of Washington measures seven outcome indicators for a specific illnesses. The Scale represents a method of identifying patients who are at risk in order to ensure that home health agencies are doing everything they can to manage symptom distress. It is a broad measure of patients' distress caused by 11 general symptoms that home health personnel consider important to monitor and manage for all home health patients, regardless of their diagnoses (LaLonde, 1987).

Home Health Databases

There are currently no comprehensive, multidimensional public use databases that contain information on home health agencies and the patients they serve including their characteristics, volume, and type of services provided. From time to time national surveys have assembled data on the characteristics of agencies, patients, and services provided, but these are not readily available.

Beginning in 1959, the Division of Nursing, USPHS, conducted periodic surveys of the availability of nursing services for the care of the sick at home. Data were initially collected only on populations served by State, county and cities with a population of 25,000 or more. The last Survey of Community Health Nursing conducted in 1979 contains data on the characteristics of Medicare certified agencies including personnel, type of services provided, and costs and fees for visits. In this survey one of the first attempts was made to collect visit data by specific programs.

Today, HCFA is the primary federal agency that collects data on the home health industry. Its Medicare and Medicaid Automated Certification System (MMACS) consists of an inventory of the survey and certification information. It includes data on all Medicare certified facilities including home health agencies, type of ownership, and their number and mix of personnel. HCFA also collects cost information from the Medicare Provider Cost Reporting Form (HCFA 1450 or UB-82 Form).

Data are available from several professional organizations that periodically conduct sample surveys of home health agencies and the services they provide. The primary non-federal agency is the National Association for Home Care which generally collects data in response to legislative mandates from their members. Two national nursing organizations, the American Nurses' Association and the National League for Nursing, collect data for specific nursing-related home health issues.

4. RESEARCH AND DEMONSTRATION METHODOLOGY

Conceptual Framework

The research described in this report was directed toward developing a home health classification method for predicting resource requirements and measuring outcomes. To achieve this objective, the conceptual framework shown in Figure 4.1 and methodology shown in Figure 4.2 were formulated to guide the approach to be taken. The conceptual framework evolved from the statement of the problem, review of the literature, and the results of an earlier pilot study that was conducted.

The principal assumption for the conceptual framework and methodological research was that by collecting a large volume of data on Medicare patients and resources used for their home health care, a classification method could be designed to predict their care requirements. This would require a national sample of home health agencies and a sample of their Medicare patients. Data would be collected retrospectively using an assessment instrument. Then, through multivariate analyses of these data, the relationship between patient characteristics (independent variables) and uses of home health services (dependent variables) as measured by number and timing of visits would be assessed.

Criteria for a valid and reliable classification method:

- Address total patient requirements for all types and levels of skills and services, and differentiate those items for which Medicare was responsible so that Medicare-covered resource requirements could be separately priced.
- Be based on assessment of critical indicators of care requirements, not on services actually used.
- Group patients with homogeneous requirements. Variation of requirements within classes would be minimized while variation among classes would be maximized.
- Be based on valid and reliable measurements.
- Be sufficiently flexible to allow substitution of qualified staff when required occasionally by local circumstances, e.g., a registered nurse who performs certain rehabilitation services when a physical therapist was unavailable.

- Be used for multiple purposes: reimbursement, planning, evaluation, staffing and quality assessment.
- Be applicable to all types and sizes of agencies offering home health services.
- Have the sensitivity to account for changes in case severity mix.
- Be easy to understand and inexpensive to use and manage.
- Be integrated into the ongoing record-keeping system of home health agencies.

Pilot Study

A pilot study was conducted to clarify the conceptual framework and methodological approach and to obtain insights into possible variables that could serve as indicators of resource requirements. It was conducted in two home health agencies -- a visiting nurse association (VNA) and a proprietary home health agency. Both were certified and both provided a comprehensive home health care program. A form was developed to abstract patient data from the agencies' records. Data were collected on a large number of variables that were conceptualized as influencing resources required and used.

The measure of resource use was determined by the number of visits made by the various providers and by the medications, medical supplies, and equipment used. The major variables included:

- Demographics: age, marital status, race, sex, education, socio-economic status, language proficiency
- Payment source and source of referral
- Social and environmental conditions: safety measures, informal and secondary care-givers
- Clinical data: principal diagnoses, surgical procedures, nursing problems, and orders for treatments, services and medications
- Functional capabilities and activity status
- Mental status
- Prognosis
- Status at discharge and final disposition

The sources of data were the agency's own records including the three HCFA forms introduced to collect standardized data for reimbursement of home health services by Medicare: (a) Home Health Certification and Plan of Treatment (HCFA Form 485), (b) Medical Update and Patient Information (HCFA Form 486), and (c) Plan of Treatment/ Medical Update and Patient Information Addendum (HCFA Form 487). Inclusion of these forms meant confining the study to Medicare patients and to only those admitted after the HCFA forms were introduced. A total of 220 records were abstracted on discharged patients for entire episodes of care from admission to discharge.

Pilot Study Conclusions

The pilot study was an invaluable guide to the design of the research project. Many useful insights were obtained concerning the sources of data, sample size and composition, and potential variables for inclusion in the research project. The pilot study also provided guidance on how best to operationalize the project tasks.

The major conclusions and recommendations from the pilot study were:

- Existing records of a home health agency can provide data on significant variables that affect services provided.
- Medicare forms, HCFA 485, 486, and 487 provided useful data.
- Several variables appeared to be related to resource use.
- Because resources used may not precisely reflect resources required, a Panel of Experts would be needed to assist in the refinement and validation of the classification method to predict resource requirements.
- Single independent variables could explain the variation in the dependent variables, but the explanatory power of combinations of independent variables appeared to be considerably greater.
- Data existed that could be used to measure outcomes.
- The Abstract Form used in the pilot study was effective and user friendly, and could be used in the project with modification based on additional refinement and testing.

Conceptual Issues

The research focused on five major conceptual issues which were addressed to operationalize the conceptual framework and methodological approach for conducting the project. They include:

- Structure and Content of Assessment Instrument
- Reconciliation of Resource Use and Requirements
- Structure and Content of Classification Method
- Structure and Content of Outcome Measurement Instrument
- Enhancing the Applicability of the Classification Method

Structure and Content of Assessment Instrument

Much work has been done in the development of assessment instruments for basic data systems for home health agencies. The instruments are designed to provide multidimensional data on patient characteristics and needs relevant to the planning and management of care. These data generally include the variables for which data were collected in the pilot study. The pilot study provided valuable information on data availability in the patient record of a home health agency. The Abstract Form was structured to contain elements that adequately captured the data in these records and provided an in-depth description of patient characteristics, and medical and nursing needs. It was designed to serve as the basis for an assessment instrument.

Reconciliation of Resource Use and Requirements

Figure 4.1 displays how data on various characteristics of home health patients could be processed into measures of resources required to provide needed services. Terminology such as requirements and needs implies standards prescribing the quantity and quality of services and other resources that should be given to patients to attain certain predetermined goals. Because scientifically based standards do not generally exist, professional judgement usually determines the specific clinical goals and the resources needed to attain the goals on a case-by-case basis.

In the absence of standards developed from experimentally derived data that specify the amount of care required by a patient to achieve certain predetermined outcomes, it was necessary to rely on empirically collected data that showed the amounts and types of care actually provided to such patients and the changes in their status that resulted. Such normative data, averaged for large numbers of patients, could provide meaningful guidelines for allocation of resources as well as for planning, budgeting, staffing, and evaluation.

Structure and Content of Classification Method

While the exact specifications of the classification method were unknown, a preliminary conceptualization was made of its essential characteristics based on work that was done previously. Although many classifications of patients exist, few are scaled according to resource use and fewer still, according to resource requirements. The DRGs are an example of a use-driven classification of patients in acute care hospitals. The RUGs II classification for long-term care patients contains the following classes, called hierarchy groups: special care, rehabilitation, clinically complex, severe behavioral problem, and reduced physical functioning. These are further subdivided into 16 groups according to an activities of daily living scale. In both the DRGs and RUGs II methodologies, weights are provided for each of the classes denoting resource consumption. These are essentially relative values and are geared to total resource use rather than specific provider categories.

The development of a classification instrument for resource requirements is analogous to **item analysis**. A universe of items (variables) is assembled. Data on the variables are obtained from a sample of respondents and are initially analyzed through such techniques as factor or cluster analysis that screen the variables to reduce them into a set of discrete indicators. The reduced set of variables are then tested for reliability (consistency) and validity (construct, content, predictive).

The pilot study yielded important clues concerning relevant independent variables. The critical test of the validity of the indicators was their ability to predict the consumption of resources that accurately reflected resources required. Moreover, it was important to arrive at a classification tool that had clinically relevant and meaningful categories.

Structure and Content of Outcome Measurement Instrument

An important goal of this project was to develop an outcome measurement tool that would be an essential component of the resource requirements prediction method. Outcome measurements serve not only to monitor and validate the assessment and classification tools, but also to form the basis for a much needed quality assurance program for home care agencies. Quality assurance is a guarantee by agencies to their consumers that certain performance standards and clinical goals are being met.

Traditional approaches to the measurement of quality of health care have addressed the structure, process, and to a far lesser extent, outcome dimensions. **Structure** refers to the characteristics of the setting (facility) in which care is provided, including staff, and services are available, etc. **Process** refers to what was done to or for the recipient of services with respect to the particular health problem for which care is provided. **Outcome** refers to what finally happened to the recipient of services in terms of the particular problem for which care was provided. Clearly, of the three dimensions, outcome has the greatest relevance and importance. Linked to structure and process, outcome measures the effectiveness of services provided. Some home care agencies are beginning to turn their attention to outcome-focused quality assurance assessments which currently are in a primitive state. These agencies obtain data at the conclusion of the episode of care on a few outcome indicators such as final disposition of the patient and the extent to which initial goals were met.

The Abstract Forms were distributed to agencies who were responsible for the selection of the sample patients and for the abstracting of the patient's entire record. The Abstract Form consisted not only of single or multiple variable questions, but also narrative text. Two nursing care items -- nursing diagnoses and patient problems and nursing interventions -- were abstracted as textual statements of data recorded in the progress notes in the patient's record.

Since there was no agreement when the study began on which specific variables predicted home health visits, the data from the sample of 8,961 patient records were thoroughly examined to analyze the statistical significance of alternative classification methods. The descriptive analysis focused primarily on frequency distributions and means. Summary measures, measures of intensity, patterns of home health services and patient assessment relationships were conducted. The predictive analysis used linear regression and analysis of variance which were the most useful statistical tests. Predictions of resource requirements were made using two types of statistical models: regression models and categorical models.

The study products included descriptive findings on the universe of home health cases and predictive findings on the variables that measured resource requirements. Several schemes were also developed for coding nursing diagnoses and nursing interventions. Finally the study produced a three cohort model based on the length of the episode of care as an approach for a preliminary home health care classification method. The method, with further refinement, could form the basis for a prospective payment system for home health care.

The study findings can be grouped into four major areas:

- Descriptive findings on characteristics of home health agencies and patients;

- Predictive findings on the relationship between measures of resource use and predictors of resource requirements;
- Cohort findings based on length of the episode of care and number and type of home visits;
- Preliminary Home Health Classification Method.

Descriptive Findings

Home Health Agencies

The descriptive analysis revealed that home health care for Medicare patients is administered by certified home health agencies (HHAs) that vary by staff size and type of ownership, and are found in all geographic locations. The HHAs offer an array of home health services with the major service being skilled nursing care. Home health nurses not only assess, provide nursing care, teach, but also manage the care of patients provided by a mix of other approved providers, namely home health aides, physical therapists, occupational therapists, speech therapists and medical social workers.

Home Health Patients

The home health Medicare patients being served are predominantly elderly, white, middle class females, married or widowed, living in their own homes with an available caregiver. The vast majority (93.8%) of patients were 65 years of age and over, and more than half of these were at least 75 years old. Sixty percent were females, less than half were married and nearly half were widowed. Nearly one-third of the patients lived alone and over 25 percent were the primary care-givers thus essentially relying on self-care. The majority of the patients were oriented and were able to comprehend and communicate.

Three-fourths of all sample patients were new admissions who were referred to the home care program from acute care hospitals. Nearly half of the patients were under the care of the home health agency for 30 days or less, almost 30 percent between 30 and 60 days and all but one percent of the remaining patients between 60 days and one year. On the average, the patients received 11.9 nursing visits as compared to the 18.2 all providers visits which were weighted to reflect two-thirds of a home health aide visit because of their lower visit costs.

Patient Assessments and Services

The assessment of the home health patients and the services provided yielded other findings of interest. In general, the average patient was assessed as having an average of three nursing diagnoses and five different types of nursing interventions for the episode. These findings provided a new dimension on home health Medicare patient care. These classification variables were analyzed as predictors of resource requirements.

Finally, the data revealed that there were significant improvements in the health status of the patients from admission to discharge. Three-quarters of the patients were evaluated as improved, recovered, or stabilized on discharge. According to the primary nurse providers in the agencies, most patient goals were fully or at least partially met. The functional status ADL scores for patients showed a significant improvement in each of the functional areas. The study thus documents the efficacy of home health care.

Predictive Findings

Predictive Variables

The predictive analyses demonstrated that home health care can be predicted reliably and that a home health classification method is feasible. Five types of classification variables (independent variables) were considered to be the major predictors of resource requirements, and four variables were selected as measures of resource use (dependent variables). They were selected based on the preliminary analysis, a review of the literature and recommendations from home health nursing experts and researchers in the field. They were analyzed separately and in various combinations, regrouped and reanalyzed.

Classification Variables (Independent Variables)

The five types of classification variables (independent variables) were evaluated as predictors of resource requirements. The variables focused on the assessment of the patient's condition: functional status, nursing diagnoses including discharge status (improved, maintained, deteriorated), nursing interventions including type of action (assess, care, manage and teach), primary medical diagnosis or surgical procedure and on selected demographics. Although the actual discharge status was used it was a proxy for the expected outcome.

Measures of Resource Use (Dependent Variables)

The four measures of resource use (dependent variables) focused on the volume of home health visits by all providers, and length of the episode of care. The number of home visits were analyzed by each type of provider. They were regrouped into nursing visits only and visits by all providers which were weighted by deflating home health aide visits by a factor of .67.

The length of an episode of care was determined by counting the number of days between the first and last visit. They were also regrouped according to the number of visits made during the first thirty days, and during the total episode of care. These two groups were used in combination with the two types of provider visits.

Analysis of Classification Variables

Linear regression was used to compute a regression coefficient for each classification variable -- demographics, nursing diagnosis and nursing intervention components -- where a single case is a member of more than one group. Analysis of the variance (ANOVA) was used for functional status, medical diagnosis or surgical procedure, combinations of discharge status groups or combinations of nursing intervention types -- where a case is a member of only one group. Two other techniques -- stepwise regression and logistic regression -- were also examined but were found not to be useful.

The major findings were:

- Demographics: The demographic variables had little predictive power by themselves.
- Functional Status: The functional status variables had limited predictive power. Both the RUGs ADL and the GU ADL scores were the poorest of all the predictor variables, even though the GU ADL improved slightly when predicting weighted visits.
- Nursing Diagnosis Components: The twenty (20) nursing diagnosis components yielded the second best predictor of resource requirements for both nursing and all weighted provider visits for the first thirty days and for the total episode of care.
- Nursing Intervention Components: The twenty-two (22) nursing intervention components were a better predictor of nursing visits than all weighted provider visits for the first thirty days of the episode. Further, by combining them with the four types of nursing intervention actions, the best predictor of resource use was obtained for any of the classification (independent) variables.
- Medical Diagnosis or Surgical Procedure: The primary medical diagnosis or surgical procedure groups did not have high predictive power.

The analyses clearly demonstrated that, in general, the nursing visits for the first 30 days had the highest values for all the nursing assessment variables separately or in different combinations and had the most predictive power. On the other hand, the medical diagnoses and functional status variables did not have values of any significance.

Cohort Findings

The three cohort model emerged as another significant finding from the analysis of the visit data. The data suggested that there was not a simple linear relationship between visits and patient care requirements, but rather that there were different types of cases with similar episodes of care. The analysis focused on testing the differences between the three cohorts.

Since nearly half of the patients were under the care of the home health agency for 30 days or less, almost 30 percent between 30 and 60 days and all but one percent of the remaining patients between 60 days and one year. However, there was a distinct difference in resources used but the differences in nursing diagnoses and nursing interventions were small. The grouping into three cohorts -- under 30 days, 30 to 120 days, and over 120 days -- was arbitrary and based on clinical judgement. They reflected the natural clustering of the lengths of episodes of care and intensity of resources used.

The analysis of the three cohorts showed that during the first thirty days, five to seven nursing visits were provided on the average for the short term cases (under 30 days), whereas nine to fourteen visits were provided for the intermediate cases (30 to 120 days) as well as for the long term cases (over 120 days). These findings identified a significant difference between the short term, acute care cases of under thirty days and the intermediate, and long term cases of over thirty days.

These findings also demonstrated that home health visits could be predicted with a greater level of precision for cohort one than for cohorts two and three. Hence visits for both nursing and all providers (weighted) were considered to be predictable for the first thirty days with the existing data.

Preliminary Home Health Care Classification Method

Based on the study findings, a clinically sound and statistically significant Home Health Care Classification (HHCC) Method was developed. The HHCC Method includes a specially designed Assessment Instrument that encompasses the length of the episode which consists of three cohorts based on the length of the episode in days, and the nursing care requirements of the patient which consists of three levels of care for each of the three cohorts.

The nursing care requirements of patients for each of the three cohorts are based on seven types of assessment data for the twenty home health care components: (a) ten socio-demographic variables, (b) nine functional status variables, (c) 147 home health nursing diagnoses, (d) three measures of outcomes identified by three discharge status/goals (improved, stabilized, deteriorated), (e) 166 home health nursing interventions, (f) four types of nursing interventions/ actions (assess, care, teach and manage), and (g) twenty medical/surgical procedure groups. The twenty-two (22) nursing intervention components were restructured to match the twenty (20) home nursing diagnosis components.

These variables are used to assess and classify patients using the specially designed Assessment Instrument. The patients are assessed on admission to home health care, and reassessed at thirty or sixty day intervals and other predetermined times. The patients are scored and classified for three levels of care for each of the three types of cohorts. The regression coefficients are used to weight and score the patients and predict the average number of home visits.

This classification method could be used as a basis for a prospective reimbursement system for home health care Medicare patients and the scheme of twenty (20) home health care components used for reimbursement like DRGs in hospitals.

Conclusions

The descriptive analysis demonstrated that home health care is provided predominantly to a white, suburban, young-elderly population. Less advantaged and higher risk patients appear to be more likely to enter long term care facilities.

The best approach to predicting home health care use is based on a nursing model using home health nursing diagnoses and nursing interventions rather than functional status or medical diagnosis. Demographics have a relatively small impact on resource use and selected demographics can be used to improve predictions based on nursing diagnoses or nursing interventions.

Home health care cases can be classified into three cohorts based on the length and type of case in days. The number of visits in the first thirty days will be significantly lower for the short term cases than for the intermediate or long term cases regardless of nursing diagnoses or demographic characteristics.

A clinically sound and statistically significant Preliminary Home Health Care Classification (HHCC) method based on a nursing model is possible. The HHCC method will encompass the nursing care requirements of the patient and predict the number of visits for an episode of home health care.

The home health nursing diagnoses and nursing interventions classification and coding schemes grouped by the twenty home health care components can be used for more efficient documentation and improved reporting of home health care. They can be used as the framework and coding the nursing care requirements for the HHCC method.

Limitations of this Study

This study collected retrospective data on discharged patients for entire episodes of home health care. As a result many of the assumptions were inaccurate and many of the data elements collected not valid because of the varying nature of the home health agencies.

The limitations arise from the limits of retrospective data and the lessons learned from developing a preliminary classification method using summary data from a large national sample. Also, the lack of standardized coding schemes for the assessment variables and the inability to collect some variables such as visit time and cost added to its weaknesses.

Recommendations

Notwithstanding the limitations of this study four recommendations clearly emerged from this research:

1. A prospective study needs to be conducted to test and evaluate the Preliminary Home Health Care Classification method. The Assessment Instrument and Scoring Methodology need to be validated by collecting data prospective, coding the assessment variables and primarily the nursing assessment variables -- nursing diagnoses, expected outcomes, nursing interventions and type of interventions.

   The patients need to be assessed on initial assessment for the three types of cases (short term, intermediate, and long term cases) with periodic updates and detailed visit data for each of the three cohorts. Periodic assessments must be made longitudinally to determine the differences between short, intermediate, and long term cases.

2. The three cohort model needs to be tested and evaluated as to its usage in the Home Health Care Classification method as a measure of care requirements and/or predictor of visits for each cohort.

3. The home health nursing diagnoses and interventions coding schemes grouped by the twenty home health care components need to be tested and evaluated as a new standard for documenting and collecting home health care nursing services.

4. The Preliminary Home Health Care Classification method using the nursing model needs to be researched and tested to determine if it can be used for reimbursement of home health care and a prospective payment system.

The development of an outcome measurement tool begins with delineating meaningful outcome criteria. Figure 4.1 contains a preliminary list of such criteria. Processing these criteria into quantitative indicators, providing valid and reliable measures of outcomes was a major task of the project. For some criteria this task was relatively straightforward and uncomplicated. Activities of daily living (ADLs) are a widely used criterion for which reasonably good quantitative measures have been developed. Although measures are not available for many other criteria, for the most part they represent objective behavioral characteristics that simplify the task of designing appropriate measures.

Another important aspect of the measurement of patient outcomes is the ability to evaluate changes in patient status by comparing status at the beginning and end of the episode of care. The Abstract Form that was developed in the pilot study was structured to contain elements which incorporated the outcome measurement criteria so that changes could be evaluated by obtaining data at the beginning and conclusion of service for a before and after comparison.

Enhancing the Applicability of the Classification Method

The project was guided by the need to develop a method that has wide applicability among all home health care agencies certified for Medicare. Every effort would be made to ensure its widespread applicability by evaluation of the method at every step of its development by the Panel of Experts in terms of its suitability for dissemination to the broad spectrum of home health agencies. Figure 4.2 displays the linkage of major tasks that were recommended to be in the project implementation.

Sample Design

The conceptual framework and methodological approach for the research underscored the need for designing a national sample from which to collect study data. Two issues had to be considered in designing the sample. First, the agencies and patients selected to participate in the project should be representative of the total universe of agencies and patients. It was considered impractical to select patients in a strictly random manner. Second, the national sample should reflect home health services existing in different areas of the country. A two-stage design (Appendix 4.1) was proposed: (a) selecting a national sample of agencies and (b) selecting patient records within each agency.

It was originally proposed that the national sample consist of 100 HHAs selected through a random process. It would be disproportionate by weighing the sample with larger agencies but would maintain representation through the stratified variables. It was assumed that each national sample agency would abstract 100 patient records totalling

10,000 cases. However, based on initial inquiry this was not realistic since the agencies themselves would be responsible for collecting the data, rather than the project staff. It was decided that the burden on the agencies had to be minimized, thus, the number of agencies were increased and the number of cases for each agency reduced to whatever each agency agreed to collect.

A revised national sample of 400 certified home health agencies (HHAs) was finally considered to be more realistic. These agencies would be selected by dividing the universe of HCFA certified agencies into 16 strata according to four types of agency ownership: (a) visiting nurse associations, (b) official agencies, (c) hospital-based agencies and (d) private agencies; in, four geographic locations in the United States: (a) North, (b) South, (c) MidWest and (d) West.

The number of agencies selected from each stratum was made proportional to size of strata, where size was measured by the number of full-time-equivalent (FTEs) registered nurses (RNs) employed. Agencies were classified as having a staff size of (a) greater than one to less than 5 FTE RNs, (b) 5 to less than 14 FTE RNs, (c) 14 to less than 65 FTE RNs, and (d) 65 FTE RNs and over.

Within each stratum, agencies were to be selected with probability proportional to agency size with the exception of 28 large agencies employing over 100 RNs which were automatically included in the sample. In addition, four matching agencies were to be identified for each of the agencies except those over 100 RNs, since some might be unable or have to decline to participate in the project. A match was defined as being in the same stratum and close in size to the agency selected. As a result a five level sample frame of approximately 400 HHAs were to be randomly selected for the universe of HCFA certified HHAs.

Figure 4.1

Conceptualization of process for predicting resource requirements and determining outcome measurements for home health patients

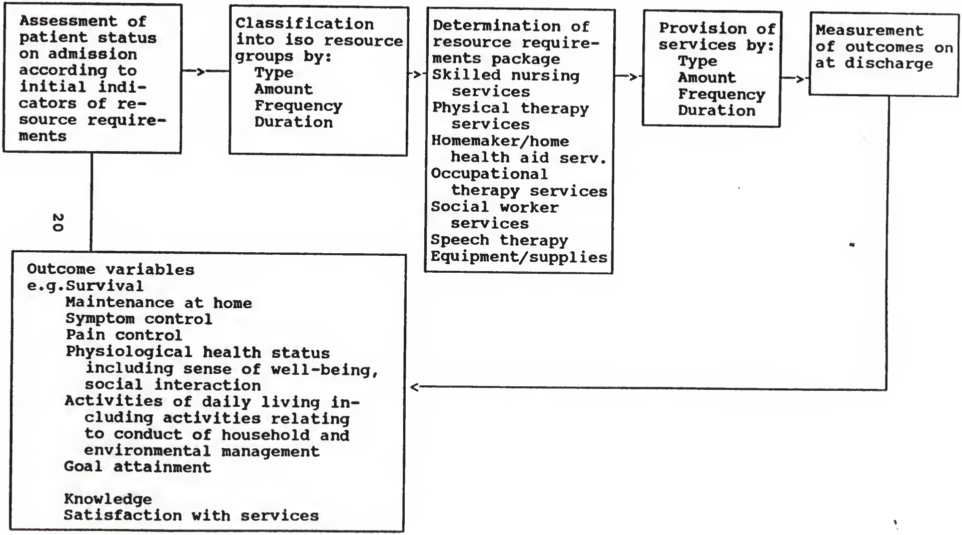
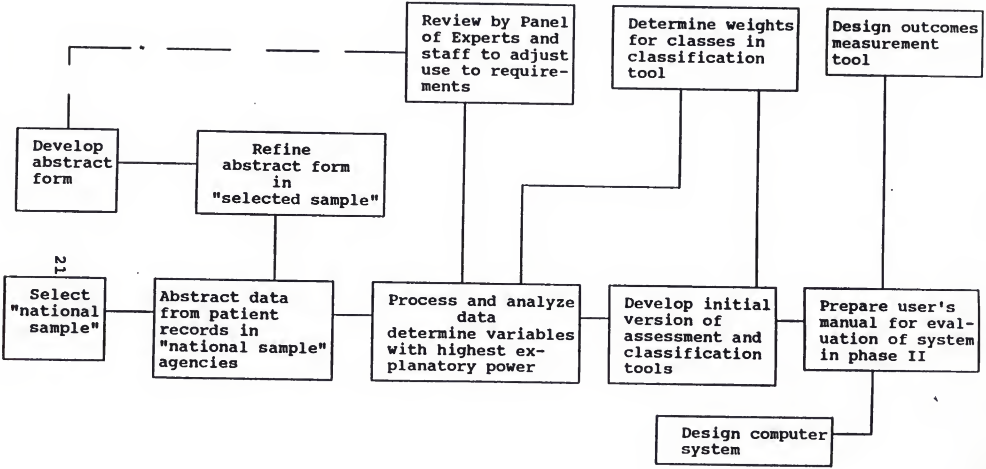

Assessment of patient status on admission according to initial indicators of resource requirements
Classification into iso resource groups by:
Type
Amount
Frequency
Duration
Determination of resource requirements package
Skilled nursing services
Physical therapy services
Homemaker/home health aid serv.
Occupational therapy services
Social worker services
Speech therapy
Equipment/supplies
Provision of services by:
Type
Amount
Frequency
Duration
Measurement of outcomes on at discharge
Outcome variables
e.g. Survival
Maintenance at home
Symptom control
Pain control
Physiological health status including sense of well-being, social interaction
Activities of daily living including activities relating to conduct of household and environmental management
Goal attainment
Knowledge
Satisfaction with services

Figure 4.2

Linkage of major tasks to be performed in phase 1


Review by Panel of Experts and staff to adjust use to requirements
Determine weights for classes in classification tool
Design outcomes measurement tool
Develop abstract form
Refine abstract form in "selected sample"
Select "national sample"
Abstract data from patient records in "national sample" agencies
Process and analyze data determine variables with highest explanatory power
Develop initial version of assessment and classification tools
Prepare user's manual for evaluation of system in phase II
Design computer system

5. RESEARCH PROJECT

The research project was guided by the need to develop a classification method that would have wide applicability among all home health agencies (HHAs) providing home health services to Medicare patients. The research methodological approach was based on a small pilot study conducted prior to the project.

The research project, which began in 1987 was conducted over a three-year period, one year longer than the proposed time frame of two years. The revised research plan, outlined in Appendix 5.1, provided a framework for this major effort. In addition, the milestone chart shown in Figure 5.1 highlights the major tasks conducted and their approximate time requirements.

Operationalization of Project

The project office was established at the Georgetown University School of Nursing. It provided sufficient space to house the project staff and was equipped with computer stations.

The initial project plans were presented at the National Association of Home Care (NAHC) annual conference held in Washington, D.C., in 1988. Individuals were solicited to participate along with a letter of invitation to approximately 350 home health agencies of which 200 directors expressed interest in participating.

The Georgetown University Public Relations Department submitted news releases regarding the project to selected nursing journals, Georgetown University Medical Center Grant News, and the NAHC Newsletter which featured the goals of the project (Appendix 5.2 for selected news releases and abstract). A research project abstract was developed as a handout for general distribution.

National experts were selected and appointed to provide external review at critical times in the life of the project. The Panel of Experts (Appendix 5.3) consisted of approximately twenty clinical home health nurses, home health agency directors, and research methodologists.

Development of Abstract Form

One of the major tasks of the project was the development of an Abstract Form to collect the data necessary for developing the home health classification method. The form was also designed to collect all relevant variables considered to be possible predictors of home health care as well as data on the actual services rendered for the patient's most recent episode of home health care from admission until discharge.

Initially, the Panel of Experts recommended that a comprehensive set of relevant variables descriptive of Medicare patients receiving services from home health agency providers be included. These variables included functional status, socio-economic characteristics, medical diagnoses and surgical procedures, nursing diagnoses and patient problems, usages of services and other services provided.

The Panel also recommended that the Abstract Form focus on four areas:

- Descriptive variables related to: (a) structure of the agency: size, ownership, income/expenses, services provided; and (b) the patient: age, sex, marital status, living arrangements, etc.
- Variables related to resources required: patient health status, nursing and medical problems, and orders for services.
- Variables related to actual resource use: number of visits, length and duration of services.
- Variables related to assessment of outcomes: health status variables that indicate changes from admission to discharge.

The initial Abstract Form was based on an adaptation of the form used in the pilot study. Other variables were added based on the review of the literature, as well as recommendations from members of the Panel of Experts. The Abstract Form also included variables available from most home health agency patient records, such as selected variables from the newly instituted HCFA 485, 486, and 487 Forms. The variables were then assessed and evaluated for their quantitative properties -- scales, weights, and scores -- in order to determine their applicability for analysis.

A separate Panel of Nursing Experts was also convened to make further recommendations. These experts recommended that the entire discharged patient record be abstracted and that the retrospective data to be collected reflect the care provided to the patient for an entire episode of care. This would include data on all patient problems/ nursing diagnoses and nursing services (interventions, treatments, procedures, and other activities). Further, they stated that the patient problems (or nursing diagnoses) and nursing services should be abstracted and recorded as narrative descriptions on the Abstract Form. This additional effort provided a complete and in-depth summary of the care process.

Preliminary Abstract Form

The first cut of the Abstract Form was completed and pretested in fifteen home health agencies in various parts of the nation, listed in Appendix 5.4. Pretest data were collected from approximately 200 discharged Medicare patient records by the project staff nurses, agency nurses and members of the Panel of Nursing Experts.

Throughout the pretest, a close relationship was maintained with those agencies to determine the reliability of data, ease of use of Abstract Form, length of time to complete the Abstract Form for a single patient record, and the variables that presented difficulties. Data from the pretest agencies were analyzed for (a) reliability (b) relevance of variables as predictors of resource requirements and measures of status changes (outcomes), and (c) application of analytic techniques for assessing the predictive power of variables and for determining statistically distinct and clinically relevant classes.

Final Abstract Form

The final Abstract Form was based on analysis of the data from the pretest agencies which was further refined and retested. It was precoded for data processing and contained an explanation of purpose of the study, definitions of variables, and instructions for completing the form. A total of 15,000 copies of the final abstract form, shown in Appendix 5.6 with its instructions, were printed.

The Abstract Form was designed to collect 73 variables considered to be possible predictors of resource requirements in home health care and critical to the project. It was designed to abstract data for an entire episode of care from admission until discharge from the admission form, intake form, nursing assessment and nursing diagnoses forms, plans of care forms, visit forms, nursing services forms, progress notes, outcomes of care notations, and discharge forms. Billing and cost data were not collected because these data are not routinely found in the patient record.

The data were to be collected from all forms in the patient record and by questioning the primary nurse for data not found in the record. The primary nurse is responsible for managing the home health care, supervising the auxiliary providers and making referrals to other providers for specialized care. This nurse is also responsible for documenting the care process and completing all forms required for the patient record.

Development of the Agency Information Form

An Agency Information Form was also developed. This form was designed to capture basic data on the characteristics of the participating home health agencies: size, organization, structure, location and type of provider including the services offered (Appendix 5.6).

The major purpose of the form was to link the patient records with the home health agencies providing the services. It was assumed that other detailed home health agency data could be obtained from the HCFA database.

Selection of Sample Agencies

It was originally proposed that the project sample be derived from the universe of Medicare certified home health agencies. As a result, a random sample of home health agencies was developed that stratified the universe of agencies by size, type and geographic location. Five separate sample levels of approximately 400 HHAs were chosen, four of which were to serve as back-up for the non-respondents.

HCFA provided the project with the Medicare and Medicaid Automated Classification System (MMACS) computer tape containing information on approximately 5,880 Medicare certified agencies as of 1986. Some 113 very small agencies (those with less than one FTE RN) were deleted because they were judged not to provide professional services directly to patients but rather were organized for purposes of meeting regulatory requirements. The remaining 5,767 agencies comprised the universe from which the national samples were selected. The provider numbers of the agencies were matched with the HCFA MMACS in order to obtain the names and addresses so that the agencies could be solicited for participation in the project.

Each of the five levels consisted of approximately 372 home health agencies by provider number. They were selected from each stratum based on type of ownership and demographic location proportional to size of strata where size was measured by the number of full-time equivalent RNs employed. Within each stratum, agencies were selected with probability proportional to agency size with the exception of 28 large agencies employing over 100 RNs.

To deal with the potential problem of a randomly selected agency declining to participate in the study, the matching agencies were identified in each of the five levels. A match was defined as being in the same stratum and close in size to the agency first selected. It was also proposed that 25-100 patient records of cases be abstracted from the first level of approximately 400 agencies to obtain the total of at least 10,000 cases. The three strata used for the national sample selection were: (a) size of agency staff, (b) type of ownership, and (c) geographic location.

Size of Agency Staff

The stratification variables were selected proportionate to agency size or number of full time equivalent registered nurses (FTE RNs) as follows:

- Over one to less than five FTE RNs
- Five to less than 14 FTE RNs
- 14 to less than 65 FTE RNs
- 65 FTE RNs and over

Type of Agency Ownership

The organizational structure, mode of operation, and type and mix of personnel were deemed critical to the sample design. The nine agency types were identified by HCFA were collapsed to four based upon organization similarities. In addition, some types contained too few agencies for a meaningful sample to be drawn, e.g, Rehabilitation-based facility with only 34 agencies. The final four types were:

- Visiting Nurse Associations/Voluntary agencies
- Official Health Departments/Combination Agencies
- Hospital-Based Agencies/Rehabilitation/Skilled Nursing Facility Programs
- Private Non-Profit/Proprietary Agencies

Geographic Location

Because of the large number of agencies being sampled and the need for stratification by geographic location, it was decided to aggregate the ten DHHS regions into four divisions similar to those of the U.S. Census Bureau. A map (Figure 5.2) shows the divisions. They are as follows:

North:	Regions 01, 02, and 03
South:	Regions 04 and 06
Midwest:	Regions 05 and 07
West:	Regions 08, 09 and 10

Selection of Sample Patient Records

A sampling plan for selecting patient records, called cases, was included in the instructions to the participating agencies. A simple random method was suggested.

The project coordinators in each project agency were instructed to review a set of recently discharged Medicare patient records for any specific time interval with a representative caseload. They were to determine the percent of cases they would abstract and then randomly select them via a simple systematic method. For example, if an agency had 50 records discharged in the last one month period, and had agreed to abstract 10 patient records, then they would abstract every fifth patient record.

Solicitation of Sample Agencies

A solicitation packet was prepared for distribution to all agencies in level one of the sample frame. The packets were sent to approximately 400 agencies each with a staff size of 65 FTE RNs. The solicitation packet contained: (a) Letter of Solicitation, (b) Project Abstract, (c) HCFA Letter of Support, and (d) Agency Response Form (Appendix 5.5).

It was subsequently determined that the original set of 400 agencies could not provide sufficient patient records to obtain the project goal of 10,000 cases. Therefore, all agencies in the remaining four levels of the five-level sample frame selected as matches to replace the agencies who gave negative responses were also solicited. This was necessary in order to solicit enough agencies to obtain the research sample of 10,000 cases. A total of 1,598 agencies were solicited of which 788 agreed to participate.

Several steps were taken in an effort to secure as large a participation as possible. Further, the agencies that agreed to participate were encouraged to provide as many cases as possible. Follow-up included: (a) contact by the State Directors of Home Care Associations; (b) announcements by the National Association of Home Care (NAHC); (c) telephone contact by project staff; and (d) specific mailings of additional project materials.

Distribution of Project Materials

Project materials (Appendix 5.6) distributed to each home health agency that agreed (either by phone or mail) to participate included the following:

- Cover letter: this was a special cover letter from the Principal Investigator which contained instructions and general information about the project. It included the toll-free telephone number that could be used for technical support and the date on which the completed Abstract Forms were due.

- Agency Information Form: an Agency Information Form was developed specifically for the project. This form was to be completed by the agency in order to provide general information about its size, type, location, type of personnel, and services provided.
- Instruction Sheet: an Instruction Sheet (two sided) was developed that contained instructions on how to randomly select the recently discharged Medicare case records to be abstracted. It also contained rules for confidentiality of patient data, making edit checks for accuracy and completeness, and forwarding forms for data processing.
- Abstract Forms: each agency received the number of forms it requested, and an additional one for their agency files.
- Envelopes: an appropriate number of pre-addressed postage paid return envelopes to return completed forms to project office.
- A letter of support from HCFA.
- Statement of confidentiality of patient data.

Collection of Data

Data collection was performed by agency staff who abstracted data from patient records. These varied from agency to agency. In most agencies a clinical nursing supervisor was responsible for the project materials. It was estimated that it took approximately one half hour to abstract one patient record or case. In addition, the primary nurse provider was interviewed for information not available from the patient record such as activities of daily living.

Follow-up Support

Toll-free telephone support was provided throughout the collection phase in order to provide technical support to agencies. The National Association of Home Care (NAHC) also provided follow-up support during the project. NAHC distributed a list of all agencies in the national sample to State Directors of Home Health Care for each of their respective states, who provided support by contacting and encouraging agencies to participate.

Follow-up Mailings

Reminder letters and resolicitation packets, where needed, were sent to ensure a database of 10,000 Medicare patient records, the project goal. Letters of thanks were sent to all participating agencies when all project materials were received (Appendix 5.7).

Reliability Testing

Early in the data collection process, it was planned that a reliability check be initiated to ensure reliability of the abstracting process in sample agencies. However, based on several attempts by the Project Director to double code patient records in several different agencies, this check was suspended because the organization and structure of the patient records varied considerably from agency to agency and did not coincide with the items on the Abstract Form. Further, it was difficult to interpret and abstract the narrative progress notes in the patient records even if the primary nurse, who was familiar with the case, was interviewed. Moreover, participating agencies expressed concern that reliability testing appeared to evaluate the care provided by agency personnel and created stress among the HHAs staff.

There was concern that this activity could have dissuaded other agencies from participating. Finally, there was concern that double coding could somehow be viewed as violating patient confidentiality. Thus, other ways of enhancing the reliability of data were initiated during the data entry and edit phases.

Figure 5.1

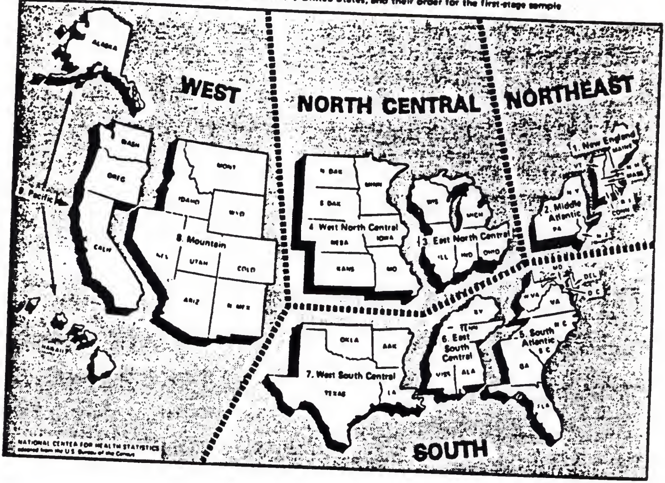
Milestones chart for home health care classification project: Date and type of task

```
                                1987              1988                              1989                                1990
MILESTONE TASK                  Jun      Dec      Mar      Jun      Sep      Dec      Mar      Jun      Sep      Dec      Mar      Jun      Sep

1. Initiate Project               ****
2. Assemble Bibliography           *****************************************************************************************
3. Develop Abstract Form             ********************************
4. Design Sample Frame               ********************
5. Solicit Sample Agencies                                **********************************
6. Support Data Collection                                         ******************************************
7. Receive Collected Data                                                 ***********************************
8. Process Pre-Coded Data                                                    *******************
9. Process Nursing Textual Data                                                       *******************
10. Edit Single Field Data                                                                 ********************
11. Edit Multiple Field Data                                                                                  ****************
12. Analyze Data                                                                             ******************************************
13. Create Datasets                                                                          ***********************************
14. Create Cohorts                                                                                                        *****************
15. Design Classification Method                                                                                                      ******
16. Write Final Report                                                                                                              *********
```

Figure 5.2

Geographic divisions of the United States, and their order for the first-stage sample



NATIONAL CENTER FOR HEALTH STATISTICS adapted from the U.S. Bureau of the Census

6. DATA PROCESSING

The assembling and processing of the data in preparation for analysis constituted a major effort. It encompassed all activities from the time the completed Agency Information Forms and Abstract Forms were logged at the project offices until they were processed into the computerized data sets ready for statistical analyses. An overview of the major steps follows.

Abstract Form Submissions

All sample returns, which included the Abstract Form and Agency Information Form, were checked for completeness by project staff. The returned forms were then logged into the Agency Tracking System which was used to track the data and assist with follow-up procedures. If discrepancies existed, they were placed in a follow-up problem file. They were tracked and followed up, and all problems were resolved prior to being data processed.

Logging Forms

The returned Agency Information Forms and Abstract Forms were logged into a computerized tracking system, which used Advanced Revelation, a microcomputer database management system. This system was designed to track the status of the forms, such as the number of forms distributed to and received from agencies, number of forms sent to and from data entry unit, and the number of forms requiring some type of error checking. It also contained the status of agencies that failed to return their forms including follow-up, late submissions, and forms with incomplete or missing data. Summary statistics were generated periodically in order to ensure the goal of collecting 10,000 abstracted patient records for the project sample cases.

Agency Information Form

A total of 646 home health agencies from the 788 agencies who agreed to participate in the project returned Abstract Forms. Each agency submitted between 5 and 50 completed Abstract Forms. The Abstract Forms were linked and matched to each agency making it possible to process data in cases by agency characteristics.

Abstract Forms

A total of 8,967 Abstract Forms were logged-in. These forms were stamped with a unique control number in at least two places on the front sheet and on the second page, and then placed in a unique agency folder. The front sheet was removed and filed in a separate locked cabinet to ensure patient confidentiality.

All Abstract Forms were stored by agency, compiled in combinations of 200 (or batches), and logged out via the tracking system with a control sheet for keyboarding.

Database Design

Database design required a major effort due to the complexity of the Agency Information Form and the patient Abstract Form. Data entry was performed by data entry clerks who keyed all data into a computer database. The database was designed for easy manipulation of the file structures and datasets for the statistical analysis.

Agency Information Database

The data from the Agency Information Forms were entered into a microcomputer database using the database management software package called Advanced Revelation. They were stored in the project office microcomputer's database and were coded and linked to the Abstract Form data.

Agency Information Forms of agencies with sub-units presented the greatest difficulty. However, when an agency sub-unit had a unique Medicare provider number it was treated as an individual agency regardless of the agency organization. For example, several state and local health departments had separate provider numbers even though the local health departments were sub-units of the state. Some proprietary chains had overlapping main and local offices, but because they were located in different states they had different provider numbers. As a result, the 646 participating agencies included 28 sub-units as separate agencies.

Abstract Patient Records Database

A plan to enter the data from the completed Abstract Forms was finalized after evaluating two options for keyboarding the data into a computer system. They included either negotiating a contract with an outside vendor, or using one of the data processing facilities on campus. The method chosen, which met acceptable project costs and provided high levels of accuracy, utilized an existing data entry staff at the Georgetown University Medical Center. The coordination and supervision of data entry was conducted by the unit director who was also the project's analytical director. Further, the unit was responsible for developing computer programs necessary for building data files for the statistical analysis.

Data Entry

Data entry procedures were tested with approximately 200 Abstract Forms and determined to be acceptable. Five types of data were entered into the computerized database from the 73 items on the Abstract Form. They included various levels of precoded data:

- Single field data
- Multiple field visit data by all health care providers
- Multiple field service data by all health care providers
- Multiple field data for nursing diagnoses
- Multiple field data for nursing intervention
  (Codes manually recorded by project staff for narrative text)

Five other steps identified as critical to data entry included:

- Single entry of all data, except nursing diagnoses and nursing interventions
- Fixed field verification by double data entry
- Sight verification of double visit data entry
- Verification of nursing diagnoses/patient problems and patient services (procedures/treatments) codes by project staff
- Sight verification of nursing diagnoses and nursing interventions data entry
- Computer corrections of logical data entry errors

The Abstract Form data were stored on a microcomputer located in the data entry unit at the Medical Center and connected to the Project Office via the ISN communication hardware (local area network) and a communication software package known as Procomm. The data from the Agency Information Form were stored on the project office's computers.

Coding of Textual Data

The Abstract Form was precoded except for two narrative sections: (a) item 46: Nursing Assessment of Patient Problems/Nursing Diagnoses, and (b) Item 44: Professional Skilled Nursing Services (Treatments/Activities/ Interventions). Both required a method for coding the narrative descriptions that addressed a complete array of textual data. Two different schemes were created to carry out this process.

Patient Problems/Nursing Diagnoses

The selection of a scheme to code the narrative text describing nursing assessment of patient problems and/or nursing diagnoses required several sequential steps in order to prepare the data for analyses. Initially, narrative text from the first 1,000 cases were keyboarded and analyzed using several **keyboard sorts**. Based on the frequency of the sorts, it was determined that the Classification of Nursing Diagnoses based on the North American Nursing Diagnosis Association (NANDA) Taxonomy I (Fitzpatrick, et al., 1989) was preferable to the Omaha Problem List (Simmons, 1980).

This decision was followed by actual testing of the scheme on several hundred cases to determine if Nursing Diagnosis Taxonomy I could be adapted for coding the narrative data in this section. Based on consultation from nursing diagnosis experts, it was found to be usable if adaptations were made. The Nursing Diagnosis Taxonomy I was adapted and expanded to accommodate the narrative descriptions as recorded by the abstractors from the 646 home health agencies. Over 40,000 nursing diagnoses were initially coded for approximately 9,000 sample cases.

The adapted coding scheme (Appendix 6.1) consisted of 147 codes (42 two digit major categories subdivided into 105 three digit subcategories). The coding structure was similar to the Ninth International Classification of Diseases (ICD-9-CM, 1980). That is, the first two digits represent major categories followed by 3 decimal places for the three digit subcategories.

Patient/Nursing Services

The coding of nursing services consisted of two different coding schemes: (a) the predefined HCFA Treatment Codes for Home Health Services (Appendix 6.1), and (b) a newly created list of home health nursing interventions specially designed for the project.

The HCFA Treatment Codes for Home Health Services were used to collect those skilled nursing services identified by HCFA as reimbursable. The codes, A1 - A27, circled on the Abstract Form, were keyboarded and merged with the second scheme of codes.

The second scheme was specifically developed to code the skilled nursing services that were recorded as narrative descriptions. These skilled nursing services included treatments, activities, and interventions that did not have a HCFA code.

Since there was no available coding scheme for home health nursing interventions found in the literature, one was developed. It emerged through a series of sequential steps designed to code the narrative nursing services data in preparation for statistical analysis. The textual descriptions from the first 1,000 cases were initially keyed into a computerized database as means of determining common terms. By using permuted **keyboard sorts**, like terms were sorted and clustered. For example:

> **Instruct Safe Mobility** and **Teach Safe Ambulation** were clustered two ways: (a) **Instruct and Teach** with common term **Safe**; and, (b) **Mobility** and **Ambulation** with the common term **Safe**.

Hundreds of other **keyword sorts** were analyzed. By using this technique a tentative list of nursing interventions, comprised of approximately 800 possible discrete nursing services. However, when pilot testing the list on live data, it was noted that there were two aspects to a nursing services description--the service itself and the type of action modifying it.

Four different nursing actions appeared over and over again which focused on: (a) patient assessment, (b) direct service, (c) teaching or educating, and (d) management and referral of home health nursing services. The nursing actions were categorized as follows:

Assess: collects and analyzes data on the health status
Care: performs a therapeutic action
Teach: provides knowledge and skill
Manage: coordinates and refers

By using different codes to depict these four actions the list of nursing interventions could be reduced to approximately 200 unique nursing services. This strategy of coding two aspects -- service and type of action -- was also viewed as a means of simplifying the coding process. With further testing and refinement, the list of nursing interventions was finalized and used to manually code the approximately 80,000 textual descriptions. Those codes, in turn, were keyed into a computer to form the nursing intervention database.

The next step in the development of this taxonomy occurred when the coded data were being edited and tabulated. Based on actual frequency counts of the nursing services and nursing actions, the list of nursing interventions that were clinically significant and measurable emerged.

Based on the most frequently used terminology, a preliminary coding scheme was designed, pilot tested, and redesigned through several iterations. The scheme was approved by experts in the field. It encompassed the HCFA treatment codes for skilled nursing services (A1-A27) already on the Abstract Form. The coding structure consisted of four digits: the first two digits represented the major categories, followed by a decimal and a third for subcategories, and a one digit suffix to code the type of nursing action.

The final Nursing Intervention Coding Scheme (Appendix 6.1) consisted of a list of one hundred sixty-six (166) codes, fifty-six (56) of which were two digit major categories subdivided into one hundred ten (110) three digit subcategories. Each of the one hundred sixty-six (166) nursing interventions was modified using one of four types of nursing actions, resulting in a total of six hundred sixty-four possible nursing services.

A total of approximately 80,000 skilled nursing services (treatments, activities, and interventions) were coded for the 8,961 patient records of cases. The total of these skilled nursing services was determined to contain unique discrete data elements.

Data Editing

The Abstract Form required extensive editing procedures. A database was initiated containing data from the first 1,000 Abstract Forms. This database was used as a model for developing several computerized programs to edit the data. This effort consisted primarily of eight editing tasks:

- Identification of disqualifiers
- Review of each record for completeness
- Identification of unacceptable responses
- Management of missing data
- Validation of medical diagnosis codes
- Validation of nursing diagnosis codes
- Validation of nursing intervention codes
- Verification of the visit dates

Data Edit Programs

Computer programs to edit the data were designed to generate error listings of the data that had to be corrected before they could be analyzed. Some errors were reviewed and corrected by the project staff; other errors required follow-up telephone calls to the agencies to review the sample records to clarify or correct errors, omissions and/or problems.

The editing of data from the Agency Information Form used the same process. All data had to be edited before computer analysis could be initiated. To facilitate correction of some errors, special computer programs were written. Data replacement programs were written to correct keyboarding errors such as changing zeros to unknown and inserting a period to represent missing data.

Data correction programs were used to generate several error lists needed to ensure the accuracy and validity of the data. They required either manual review of the individual Abstract Form, and/or telephone follow-up to the agency. A log was generated for each correction list and compared to the Abstract Form to confirm the accuracy of the data edit corrections. The major problems involved:

- Non-Medicare cases
- Non-nursing visit cases
- Cases with admission date after first visit date
- Cases with discharge date prior to last visit date
- Age verification of cases under 65 and/or over 90 years of age.

Detection of Outliers

The cases with different outliers were reviewed and dispositions established for each different variable. For example, the visit dates were reviewed for the extremely long cases, stated ages were compared to birth dates, admission dates to dates of first visit, and discharge dates to dates of last visit. Tight edit controls in the data entry process minimized the need to verify data frequency distributions and histograms. Screening of data for internal validity was necessary and cases with extreme values were examined. Cases with visit data outliers were omitted from the predictor analyses.

Computer Datasets

Computer datasets consisted of the edited data elements suitable for processing by computer using SAS and SPSS statistical software packages. The datasets were designed so they could be transferred for mainframe, minicomputer and large microcomputer processing.

The multiple response questions and the variables were transformed for data processing. Clear labels for variable names and values of codes were entered to make printouts readable.

The following criteria were used to prepare computer datasets composed of records of data element as follows:

- One per patient
- One per visit. Visit data were further analyzed according to the following criteria:
    - Summary of visits by case
    - Total visits by case
    - Provider visits by case
    - Length of episode of case
- One per medical diagnosis/or surgical procedure
- One per nursing diagnosis with discharge status
- One per nursing interventions with type of action
- One per agency (646 HHAs: Appendix 6.2)

There were seven separate computer datasets representing the raw data (Appendix 6.3). All datasets were fixed length, fixed format ASCII records. Corresponding SAS datasets were also available. Several additional derived summary datasets were required for analysis such as datasets which count the total number of visits by a particular provider type during a period of time (such as first 30 days or total case), and datasets which recoded the nursing diagnoses and interventions into home health care components. Additional datasets included the special dummy variables for building predictive models, as well as merged datasets for combining data from all of the raw datasets. Seven computer datasets were developed and are described below:

Abstract Form Dataset

The Abstract Form dataset (8,960 records) was the main dataset with fixed field records. It contained all of the pre-coded responses on the Abstract Form. There was one record per case and it included up to six medical diagnoses and/or surgical procedures. The dates of admission and discharge to home care were less reliable than the actual visit dates. The dates of hospital episodes were also not completely reliable.

Nursing Services Dataset

The nursing services dataset (8,960 records) contained the 85 HCFA treatment codes from the HCFA 485 Form as alphanumeric text, one code per record, multiple records per case.

Visit Dates Dataset

The visit dates dataset (182,607 records) contained the actual visit dates for all six types of providers. Since cases may have had more than one visit by the same provider type on the same date, there was a field for number of visits which was normally set to one unless there was more than one visit on the same date. There was an average of twenty records per case.

Nursing Diagnoses Dataset

The nursing diagnoses dataset (40,493 records) contained the complete information coded from narrative nursing diagnoses and patient problems section of the Abstract Form including the discharge status for each nursing diagnosis.

Nursing Interventions Dataset

The nursing interventions dataset (81,185 records) contained the complete information coded from the narrative nursing services (interventions and treatments) section of the abstract. It also included the prefix code for the type of intervention (assess, care, manage, teach) and the three digit intervention code.

Agency Information Form Dataset

The Agency Information Form dataset (646 records) contained data about agency characteristics and staffing from the agency data form. It contained similar data items to the HCFA MMACS computer tape.

Patient Records of Cases Dataset

The patient records of cases dataset (8,960 records) contained the linkage information necessary to link a case to the agency data and to the Medicare claims. They also included the zip code and the date the abstract was prepared. They were kept separately to preserve confidentiality of medical data, but the agency number was usually merged with the abstract record.

Summary Measures

The large number of variables for each case required the use of summary measures to simplify the analysis. The visit dates were summarized using measures of dispersion. Methods were developed to cluster and aggregate other data elements, such as summary ADL scales, summaries of patient problems/nursing diagnoses, patient services/nursing interventions, and medical diagnoses or surgical procedures.

Measures of Case Intensity

Measures of case intensity were considered critical to refine aggregations of visits during an episode of care. The frequency and pattern of visits as well as the provider mix of services were measured in a fashion which was independent of although correlated with the length of the episode of care.

Patterns of Home Health Services

Basic descriptive analyses including multivariate analyses of variance provided insight into variation in patient characteristics such as socio-demographic variables and functional status, as well as patient assessment, services, and outcomes. Because of the large number of statistical tests used, significant differences due to chance alone were likely, thus, conservative approaches were employed in analyzing the data.

Patient Assessment Relationships

The relationships between the various patient assessment variables: (a) medical diagnoses or surgical problems, (b) nursing diagnoses, (c) nursing interventions, and (d) provider mix of services were explored to identify clusters and classes of patients.

Predictive Analyses

Linear regression and analysis of variance (ANOVA) were the most useful statistical tests for predicting resource requirements. Stepwise regression and logistic regression tests were also explored, but found to be less useful and less appropriate for the data. Predictions of resource requirements were made using two types of statistical models: (a) regression models and (b) categorical models.

Regression models are linear regression equations which compute the predicted value of a dependent variable using one or more (multiple) independent or predictor variables. Categorical models are regression equations that assign each case to a single category such as primary medical diagnosis or surgical procedure based on a categorical variable.

This section first describes the statistical methods used to compute and evaluate the predictor variables; secondly, it describes the different variables used in the various regression and categorical models. The findings obtained with the most statistically significant regression and categorical models will be presented in Chapter 9.

Excluded Cases

As has been explained, for purposes of studying resource utilization, the study was limited to Medicare nursing cases of less than one year duration. Consequently, the atypical chronic cases (several years in duration) and the non-nursing cases requiring only physical therapy were excluded.

Linear Regression

Linear regression computes a regression coefficient for each independent variable in the predictor models which is essentially a measure of the weight of the variable. Linear regression was used for all predictor models based on demographics, nursing diagnoses, and nursing interventions because a single case is a member of more than one group. A simple additive model was used which ignored interactions among groups. Linear regression models were also used for combinations of nursing diagnoses, nursing interventions and demographics. The regression models used dummy variables which were assigned the value of 1 or 0 to indicate the presence or absence of a demographic variable, nursing diagnosis, or nursing intervention in a particular case.

The predicted number of visits for any case is computed by adding the regression coefficients, for example, nursing diagnoses to the intercept value. The intercept is an artificial term which is the number of visits for a case without any nursing diagnoses. It is used to compute and minimize the variance in the regression.

The individual regression coefficients in this type of model are interpreted as the average number of additional visits to manage a case with a particular nursing diagnosis compared to cases without that nursing diagnosis. Negative regression coefficients are seen for nursing diagnoses which require fewer visits than cases which lack those nursing diagnoses.

The tables of regression coefficients (Chapter 9) include the overall mean number of visits so that the magnitude of the regression coefficient (i.e., additional visits required) can be compared to the mean number of visits for all cases. The overall R-square of each model is also included and used to evaluate the ability of the model to predict resource requirements.

Analysis of Variance (ANOVA)

Analysis of variance (ANOVA) was used for variables (such as ADL scales) where cases are classified into a single mutually exclusive group. ANOVA by the General Linear Model (GLM) method was used in place of a simple ANOVA procedure because it provides a more valid statistical treatment for groups of varying size and variance. ANOVA computes group means within each classification category, such as level of ADL score or primary medical diagnosis, and then tests for difference between the group means. The predictive value of the dependent variable is the mean value for that categorical model.

ANOVA also provides a comparison of difference between the within group and between group variance that is a measure of the effectiveness of the predictor model. This method was used to develop categorical models for functional status (ADL), medical diagnosis, combinations of nursing intervention types, and combinations of nursing diagnosis discharge status (treatment goals).

Stepwise Regression

Stepwise regression was explored as an alternative to linear regression because it helps to focus on the key independent or predictor variables which have the largest influence on the dependent variable. Stepwise regression selects independent variables for inclusion in the model based on their contribution to explaining the variance in the dependent variable and continues to add (or remove) variables from the model as long as there is a statistically significant change in the regression results. The final regression model contains only a subset of the independent variables.

Stepwise regression was tested using our regression models and found to be less useful clinically than simple linear regression because the resulting models dropped many clinically interesting variables and the regression parameters were different from those found with linear regression and harder to interpret. The tables of regression results (Chapter 9) presented include only the results of linear regressions which include all components of each regression model and excludes the stepwise regressions.

Logistic Regression

Logistic regression is a specialized form of regression analysis in which the dependent variable has only two possible values such as true or false. Logistic regression was used for the prediction of membership in Cohort 1 (cases under 30 days). This approach yielded statistically significant results but they were not clinically useful since the data were based on a discharge abstract summary for the entire episode of care and not on an admission assessment. The amount of variance explained and the accuracy of the predictions were relatively small and therefore the detailed results of this analysis were not presented.

Evaluating the Performance of Prediction Models

The overall R-square proved to be the best tool for comparing the performance of different regression or categorical models in predicting resource use. A complete description of the evaluation of these models follows.

Statistical Significance of a Model

The overall statistical significance (p value) of a regression model or categorical model compares the model's ability to predict the value of the dependent variable with that expected from chance alone. Statistical significance is easy to achieve with large samples; therefore it should not be the only step in assessing the performance of a regression model. All of the models presented below were statistically significant which means that the predictor variables exceeded chance alone in predicting the value for the dependent variable.

Variance Explained by Model R-square

The R-square of a model indicates the percent of variance explained by the regression equation or model. R-square provides a good measure for determining which models explain more of the variability of the dependent variables. The R-square is based on partitioning the variance around the mean of the dependent variable into a portion that can be explained by the categorical model (and quantified in the regression coefficients of the regression model or the group means of a categorical model) and a residual or error term which represents case to case variation (due to chance and other factors) which is not explained by the model.

Magnitude of the Regression Coefficients

The value of the individual regression coefficients (which can be positive or negative) is a measure of how strongly a single independent variable (such as a demographic variable or a nursing intervention) influences the total resource utilization. Review of a list of predictor variables sorted by regression coefficients provides insight into the independent variables which influence resource requirements. For example, the mix of home health providers should impact on the predictor variables and numbers of visits.

Statistical Significance of the Regression Coefficients

Sorted lists of regression coefficients were used by first testing each coefficient for statistical significance against a null hypothesis that the value of the coefficient is not significantly different from zero. Even if the overall regression is significant, many of the individual coefficients may be too small to be distinguished from zero at an appropriate level of statistical significance such as $p \leq .05$.

Regression coefficients not statistically significant in their own right were not analyzed to draw conclusions independent of the overall model in which they appear. It was important to distinguish between the p value of a single regression coefficient and the p value for the regression equation or model as a whole. The whole model can be a good predictor of resource use even if several of the variables used to construct the model make such small contributions to the regression model that they cannot be statistically considered as greater than zero.

Partial Correlations in the Stepwise Models

The sequence of addition of variables to a stepwise model is controlled by the amount of variance explained rather than by the simple magnitude of impact on the regression coefficient. Only significant coefficients are included in the stepwise models. As explained above, the results of stepwise regression were hard to interpret; the linear regression models which include all of the nursing diagnoses or nursing interventions were found to be preferable.

Development of Regression and Categorical models

Development of the regression and categorical models was designed to construct a home health classification method for predicting resource requirements. Other health care classification methods generally divide the population into a limited number of mutually exclusive groups such as the 470 DRGs used in acute care hospitals. As stated as a critical issue, home health care does not lend itself to any simple unidimensional classification method because there is no valid and widely accepted method for designating a single primary nursing diagnosis or nursing intervention to a case.

The regression and categorical models frequently combined several different dimensions of the case. Each took into account the range, variety, and number of different nursing diagnoses or nursing interventions seen in a single case. The concept of the components of home health care was developed during this study to allow for analysis of complex home health nursing cases with a manageable number of variables that can be included in valid and useful regression models.

Simpler categorical models based on activity of daily living (ADL) scales or primary medical diagnosis were also evaluated for comparison with the regression models. Some of the most effective predictions were achieved by combining more than one regression model into a large composite regression model based on more than one dimension such as demographics and nursing diagnosis HHC components.

Measures of Resource Use
(Dependent Variables)

A key problem in developing categorical models is to define appropriate measures of resource use for home health nursing. Acute care hospitals have used the length of stay or the total cost as measures of resource use for purposes of developing diagnosis related groups (DRGs) for predicting resource use. Comparable summary measures such as length of stay (LOS) or total cost were not available from the patient record for home health care where each case consists of separate visits by a varying mix of provider types spread over a variable period of time.

The length of the case between the first and last visit is not by itself an appropriate measure of resource use because it does not reflect the intensity of care provided; some cases may have as few as one visit per week while others require two or three visits per day. The length of case described later is presented in cohort model as being separated into three classes: (a) short term (under 30 days), (b) intermediate (30 to 120 days), and (c) long term (over 120 days).

Since the focus of this study was on home health nursing care, it was limited to two key dependent variables -- number of visits and length of episode. Home visit data were collected separately for all providers. However, based on the frequency distributions only two measures were considered significant -- nursing visits and all provider visits which were weighted to reflect the home health aide visit as two-thirds of a visit. The length of each case was also analyzed according to various time intervals. This resulted in the selection of two significant time periods -- first 30 days and total episode. This approach made it possible to test a very large number of regression and categorical models.

Nursing Visits for First Thirty Days

The number of nursing visits within the first thirty days of each episode of care (NVRN30) for each case (start of case defined as the date of the first visit) was used as a dependent variable because preliminary descriptive analysis revealed that the intervention level of the case was most intense during that period. Focusing on the first thirty days of the case (regardless of the total length of the case which exceeded thirty days in about half of the cases) proved to be a good strategy in reducing variability between cases due to varying length of the case and provided a better dependent variable for testing the ability to predict resource use with the regression models.

Weighted Total Visits for First Thirty Days

The weighted total visits for all providers (treating home health aide visits as 2/3 of a nursing visit) during the first thirty days (NVWT30) was used as a more refined measure of the predictive capability of the independent variables -- demographics, nursing diagnoses, and nursing interventions, than the total case weighted visits (NVWTALL) (dependent variable), which varied over a wider range due to other factors which might have affected the total length of the case.

Nursing Visits for Total Episode

The total number of nursing visits during the entire case (NVRNALL) (cases over one year in duration were excluded from this portion of the analysis) was the main dependent variable explored initially and hypothesized to correlate best with the nursing diagnoses and nursing interventions.

Weighted Total Visits for Total Episode

The weighted total number of visits (NVWTALL) included visits by all six provider types: (a) skilled nursing, (b) home health aide, (c) physical therapist, (d) occupational therapist, (e) speech therapist, and (f) medical social worker. The total number of visits was calculated for the entire episode of care and was used as a dependent variable. This variable was the best measure of total resources used and the total cost of the entire episode of care.

Length of Episode/Cohorts

The length of the episodes of care for all cases was classified into three cohorts: (a) under 30 days), (b) 30 to 120 days, and (c) over 120 days. These were considered to be indicators of the type of home health nursing care required: short term, intermediate, or long term. Membership in one of the cohorts helped determine which regression or categorical model to use and it was also used to classify the cases for descriptive purposes to test for differences in the frequencies of nursing diagnoses and nursing interventions. Cohort membership was also used as a dependent variable for regressions in which cohort membership was predicted.

Dependent Variables Not Used in this Analysis

Some dependent variables were developed but were not used in the analysis because they were not considered important. Lack of resources also limited the analysis of additional variables. Because the project focused on home health care, for which nursing is the primary provider, the nursing diagnosis and nursing intervention variables were analyzed as predictor variables but also the number of nursing visits were analyzed as measures of resource use.

Visits by Home Health Aides

The number of visits by home health aides in the first 30 days and for the total case might be an interesting dependent variable to explore. These visits might relate differently to specific nursing diagnoses or nursing interventions than nursing visits. The mix of skilled nursing and home health aide visits may also be more influenced by agency factors than patient factors. The analysis of visits by home health aides should be pursued in future studies where agencies could provide a larger number of cases per agency.

Visits by Other Professionals

Visits by professionals other than skilled nursing and home health aide included physical therapy, occupational therapy, speech therapy, and medical social work. Because these services were not uniformly available from all agencies, it was decided to include them in the aggregated weighted visits rather than analyze them separately.

Unweighted Visits by All Providers

The unweighted total number of visits was not a good proxy measure for cost and not well correlated with the predictor variables as was the weighted visits measure.

Actual Total Cost of Episode

Data on actual total cost of the episode of home health care for each case were not available and not included in the analysis. Costs of visits vary by size of agency, type of agency ownership, and geographic location. While access to HCFA claims data can provide information on costs, data may well be a less valid and precise measure of resource use than visit data.

Predictors of Resource Requirements
(Independent Variables)

A major problem in developing categorical models was to define appropriate predictors of resource requirements for home health care. Acute care hospitals use the diagnosis related groups (DRGs) for classifying inpatient admissions and predicting resource use. DRGs are not applicable for home health. Further, studies have shown that the medical diagnoses, upon which the DRGs are based, have little or no relationship to resource requirements for home health services.

Seven types of independent variables were considered to be the most significant predictors of resource requirements. These were determined from the descriptive analysis of the data elements. Each type of variable represents a different aspect of the case considered to have an impact on the resources needed for an episode of home health care. They include: (a) demographics, (b) functional status, (c) nursing diagnoses, (d) nursing diagnoses discharge statuses, (e) nursing interventions, (f) types of nursing interventions, and (g) medical diagnosis.

These variables were evaluated according to their impact on actual resource use. They were analyzed and evaluated using the regression and categorical models. These variables are described in this section and findings are presented in Chapter 9.

Demographic Regression Models

Demographic variables are often considered to be significant predictors of resource requirements. Generally, individual variables were not found to be significantly related to resources used; however, when used in combination, they were significantly related. Ten demographic variables were used to build the regression models. Each of these demographic variables were regrouped and recoded as binary dummy variables represented by 0 = no and 1 = yes. They included: (a) age, (b) male (sex), (c) white (race), (d) married (marital status), (e) lives alone (living arrangement), (f) cares for self (available caregiver), (g) owns house (housing), (h) comprehension level, (i) communication level, and (j) pets in home.

Functional Status Categorical Models

Functional status is considered a good predictor of resource requirements. Functional status was measured and analyzed using five different scales of the activities of daily living (ADL). Two of the five scales previously described were selected for the predictive models: (a) RUGS ADL with four data elements, and (b) Georgetown Scale (GU ADL) with nine data elements. Each of these two scales were tested using the categorical model which measures a single variable for each case as a predictor of resource requirements.

Functional Status: RUGS ADL

RUGS ADL has a possible score that ranges from 3 to 10. It consists of a four item scale that measures: (a) toileting, (b) eating, (c) tube or parental feeding, and (d) transfer.

Functional Status: GU ADL

The Georgetown functional status (GU ADL) scale has a possible score that ranges from 9 to 27. It consists of nine items: six Katz ADLs plus walking and two IADLs. They are: (a) bathing, (b) dressing, (c) toileting, (d) transfer, (e) continence, (f) feeding, (g) walking, (h) using the telephone, and (i) managing medications. This scale provided a better predictor of resources requirements than the others.

Nursing Diagnoses Regression Models

The number of nursing diagnoses (regardless of specific nursing diagnosis or groups of nursing diagnoses) were explored in a regression model. The model assumed that the number of different nursing diagnoses reflects the complexity of the case and the intensity of home health care.

These regression models based on the original two lists of nursing diagnoses: (a) list of one hundred forty-seven (147) (two and three digit) and (b) list of forty-two (two digit) nursing diagnoses were not useful because the other regression models indicated that all models using nursing diagnoses are not equivalent for the resource requirements they predict. Further, the level of detail of the two and three digit coding schemes varied and may not have been applied uniformly by all agencies.

Twenty Nursing Diagnoses HHC Components

Twenty (20) nursing diagnosis (RN Dx) home health care (HHC) components were developed by regrouping and recoding the one hundred forty-seven (147) nursing diagnoses. Based on the actual frequencies, they did produce a useful regression model. They were better predictors of resource requirements than the number of specific nursing diagnoses and a more realistic measure than the list of one hundred forty-seven (147) nursing diagnoses or forty-two (42) major nursing diagnosis categories, nine human response patterns or eleven functional health patterns.

Discharge Status/Outcome Measures

It was determined that the discharge status of each nursing diagnosis could serve as proxy measure of the expected outcome or treatment goal for a case. This determination could also be used as an appropriate measure for quality of care assessments. The discharge status of each nursing diagnosis was coded using five categories. They were regrouped and recodea into three discrete outcomes: (a) **Resolved/Improved**, (b) **No Change/Stabilized**, and (c) **Worse/Deteriorated.**

These were merged with the list of 20 Nursing Diagnosis HHC Components and the combined scale was used in the regression models.

Discharge Status Patterns

Patterns of the three discharge/outcome statuses (regardless of the number of times they were used) were also used to build a categorical model which would separate cases which were focused exclusively on curable nursing diagnoses from those in which no change or deterioration was expected. These were then analyzed using actual combinations.

Nursing Interventions Regression Models

The number of nursing interventions (regardless of which specific interventions or types of interventions) was also explored in a regression model. Based on the assumption that the number of different nursing interventions reflected the complexity of the case and the intensity of home health care.

The regression model based on the lists of the fifty-six (56) two digit, one hundred sixty-six (166) two and three digit, or the list of the four digit nursing intervention data was not useful because the other regression models indicated that all models using nursing interventions are not equivalent in the resource use they predict. Further, the level of detail in the three and four digit coding schemes was diverse and may not have been applied uniformly by all agencies.

Twenty-two Nursing Intervention HHC Components

The twenty-two (22) nursing interventions (RN Rx) HHC components were developed by regrouping and recoding the one hundred sixty-six (166) nursing interventions. Based on the actual frequencies, they produced a useful regression model. The number of different nursing intervention components involved in a case was a much better predictor of resource use than the number of specific nursing interventions. These twenty-two (22) nursing intervention components were based on actual frequencies and correlated with the twenty (20) nursing diagnosis HHC components. These components provided a more realistic measure than the original list of one hundred sixty-six (166) nursing interventions or list of fifty-six (56) major nursing intervention categories.

Types of Nursing Interventions

A scheme of four discrete types of nursing intervention was also used. The scheme consisted of: (a) **Assess**, (b) **Care** (c) **Manage**, or (d) **Teach**. Regression models were constructed by counting the number of interventions for each type of action. The four regression coefficients which are computed reflect the relative contribution of each of these types of nursing interventions. They were analyzed with the 22 nursing intervention HHC components making 88 possible combinations.

Unlike most of the other regression models using dummy variables which can only have the value of zero or one, these models used the actual number of nursing interventions for each type.

Patterns of Types of Nursing Interventions

The patterns of combinations of different types of interventions (regardless of the number of times each type was used in a single case) were used to build a categorical model which compared cases which were **Teach** only to cases which involved a different pattern of care such as **Assess and Manage**. Some of the smaller frequency groups were combined by adding the type **Assess** to other combinations of types such as **Care and Manage** which imply that assessment was also done. These four types of nursing interventions were analyzed using actual combinations.

Medical Diagnosis Classification Models

Twenty Medical Diagnosis Groups

The primary reason for admission for an episode of home health care is a medical diagnosis (MD Dx) or surgical procedure groups. These conditions were selected from the ICD-9 CM using both body systems of disease conditions and surgical procedures. Because only one variable was used for each case, they were based on actual frequencies of the primary medical or surgical procedure. As a result twenty (20) groups were used as predictors of resource requirements.

Composite Regression Models

Several composite regression models were formed by combining all predictor variables from two or more regression models into a single large model. The advantage of these combined models is that more independent variables should work together to explain more of the variance and the simultaneous use of two sets of predictor variables provides another comparison of their relative roles in determining resource requirements in the overall case. The size of the regression coefficients, or the order of their inclusion in a stepwise regression model, can be used to compare the relative importance of nursing diagnosis and nursing intervention, or demographic factors vs. nursing factors.

The following is a list of the composite models which were tested:

- Nursing Diagnoses and Nursing Interventions (RN Dx, RN Rx) Regression Models
- Nursing Diagnoses and Demographics (RN Dx, Demo) Regression Models
- Nursing Interventions and Demographics (RN Rx, Demo) Regression Models
- Nursing Diagnoses, Nursing Interventions, and Demographics (RN Dx, RN RX, Demo) Regression Models

Analytical Methods for Cohorts

Review of the descriptive data for visits, nursing diagnoses, and nursing interventions led to the hypothesis that home health care nursing cases could be separated into three types: (a) short term cases of less than thirty days which will focus on solutions of immediate problems through care, teaching, or referral; (b) intermediate cases of 30-120 days duration which will focus on continued care; and (c) long term cases of over 120 days which will focus on chronic cases which do not improve in status or get resolved.

Separation of the cases into these three cohorts was studied collectively and separately and therefore was anticipated would require separate predictive analyses for each cohort because their resource requirements are different. The regression models and categorical models were designed to predict resources based on the differences in patient characteristics (demographics, nursing diagnoses, nursing interventions, and medical diagnosis) noted in the descriptive analysis.

The analysis of the cohorts focused on three tasks: (a) describing the characteristics of each cohort, (b) predicting which cohort a case would belong to, and (c) describing variations in the home visits for each cohort for different periods of time such as first thirty days or total episode of home health care.

Because this was a retrospective study, the cases would be classified based on the length of the episode and placed into cohorts. However, prospective approaches will be needed to predict and validate these findings.

8. DESCRIPTIVE FINDINGS

Overview

The GUHHC research project provided one of the most complete descriptions of the home health care industry ever obtained. It provided not only information on a national sample of Medicare certified home health agencies, but also detailed information on the abstracted patient records, called cases, served by these agencies. Many of the findings validate previous knowledge about the home health industry and its Medicare patients. In addition, this research project collected new information which provides a better understanding of this expanding and important health care field.

This section provides an overview of the descriptive findings from analysis of the research data. It contains a brief description of the national sample of 646 home health agencies (HHAs) each of whom abstracted approximately 5 to 50 patient records. Also presented in this section is an in-depth analysis of the 8,961 patient records of cases that were collected for episodes of home health care that occurred primarily in 1988. These sample records were analyzed, not only in comparison to the national sample of HHAs, but also according to the variables that were considered relevant to the development of the home health classification method.

Home Health Agencies

The national sample of 646 home health agencies (HHAs) that participated in the research project consisted of those who agreed to participate from a sample frame of 1,580 HHAs. They were randomly selected from the 1986 HCFA Medicare and Medicaid Automated Certification System (MMACS) list of 5,880 certified HHAs.

These 646 HHAs represented 40.9 percent participation of those solicited (1,580) and 10.8 percent of the universe (5,880) of certified HHAs. The national sample HHAs, when analyzed using the sample frame criteria, clearly demonstrated that the GUHHC project national sample was representative of the universe of certified HHAs. The criteria were: (a) agency staff size, (b) type of agency ownership, and (c) geographic location.

Agency Staff Size

The staff size of the HHAs was analyzed according to the number of full time equivalent (FTEs) registered (skilled) nurses employed. Agencies were grouped according to four strata: (a) 1 to less than 5 FTE RNs, (b) 5 to less than 14 FTE RNs, (c) 15 to less than 65 FTE RNs, and (d) 65 and over FTE RNs which also included the 28 HHAs with staff size of 100 FTE RNs and over.

The staff sizes of the national sample were compared to the universe of Medicare certified home health agencies (HHAs). As shown in Table 8.1, the largest number of HHAs that participated in the study were medium sized agencies (5 to < 14 FTE RNs), or 37.5 percent. However, the smallest staff size HHAs (1 to < 5 FTE RNs), representing the largest group (60.9%) of HHAs in the universe, participated more than expected, 9.5 percent. This involvement was significant, since this group has the least amount of resources to participate in a study of this kind. On the other hand, the large HHAs, undoubtedly have adequate resources for participation in the project actually had the least participation, almost 3 percent.

Type of Agency ownership

The type of HHA ownership was also used as one criterion in the selection of the national sample. They were grouped according to four types of ownership strata : (a) voluntary, (b) hospital-based, (c) official, and (d) private non-profit home health agencies. As shown in Table 8.2, these four types of ownership groups were well represented in the sample. The largest number of HHAs in the national sample were the private, non-profit and proprietary HHAs, with 31.3 percent. This group also represented the largest group in the universe of certified HHAs and highlights the trend in the industry from voluntary towards private ownership.

The official agencies, which include health departments and combination agencies participated the least, 17.3 percent. Though they are HCFA certified, these agencies generally provide only home health services to indigent patients.

Geographic location – Four Regions

Geographic location was also used as a criterion in the selection of the national sample. Geographic locations were grouped into four regions of the United States: (a) North, (b) South, (c) Midwest, and (d) West. As shown in Table 8.3, the four geographic locations were well represented. The largest number of participating HHAs were from the North and Midwest with 29.7 percent each. When compared to the universe of HCFA certified HHAs they were similar in representation.

Geographic Location – States and Regions

The national sample had representation from every state in the United States. As shown in Table 8.4, all 50 states, Puerto Rico, and the District of Columbia participated in the research project. New York, Pennsylvania and California were the three largest states to participate representing over 20 percent of the HHAs.

The national sample agencies were also compared to those in the universe of certified HHAs by the ten geographic regions. As shown in Table 8.5, the national sample represented 10.8 percent of the universe, and included all ten DHHS regions. The largest representation was from Region V with 22.4 percent and the lowest was from Region X with 2.7 percent. The Northwest, Midwest, and Southwest Regions provided less than 5 percent of the sample. These are areas which are sparsely populated and where state and local official health departments provide the majority of the home health services.

Patient Records of Sample Cases

A total of 8,967 sample cases were collected from the 646 HHAs representing a national sample of home health care patients. These were patient records of recently discharged cases that were abstracted for an entire episode of home health care to form the research project sample population called cases. This sample of cases characterizes the Medicare population receiving home health care services. It is one of the largest compilations of home health patient data ever assembled together for analysis.

These sample cases were analyzed to provide a profile of the home health cases according to the HHAs that provided the care. They were analyzed according to the same criteria used to select the national sample, namely: (a) agency staff size, (b) type of agency ownership and (c) geographic location. They were not analyzed by individualized HHAs because the average number of cases collected per agency, fourteen, was too small to be statistically significant.

The actual number of cases analyzed in this section was based on a sample size of 8,840. The original sample submissions of 8,967 cases was revised downward to exclude 127 cases that did not meet the research criteria. Six cases were outliers with episodes of care over ten years duration, 39 cases were non-Medicare recipients, and 82 cases were considered non-nursing because they did not provide evidence that a nursing visit was made during the episode of care.

Cases by Agency Staff Size

The 8,840 research cases were analyzed according to the criteria used to select the national sample of HHAs. The first criterion, agency staff size was similar to the national sample of agencies. As shown in Table 8.6, the medium sized HHAs (5 to < 14 FTE RNs and 15 to < 65 FTE RNs) together provided the largest number of cases, 6,600 or 74.7 percent. The largest HHAs staff size (65 and over FTE RNs) provided the fewest cases, 448 or 5.1 percent.

Cases by Type of Agency Ownership

When the 8,840 sample cases were analyzed, by types of agency ownership, the distributions were similar to the national sample (Table 8.7). The largest number of cases were collected from the private, proprietary agencies, 2,956 or 33.4 percent. The voluntary agencies, including the visiting nurse associations and hospital-based agencies, collected fewer. This is probably due to lack of resources. The smallest number of cases were collected by official agencies, 1,279 or 14.5 percent. As previously stated they generally provide home health care services to indigent patients.

Cases by Agency Geographic Location – Four Regions

The sample cases were also analyzed by the third criterion used to select the national sample – four geographic regions. As shown in Table 8.8, the number of cases in four regions was almost identical to the national sample. This finding reinforced that fact the research sample cases provided a representative sample of universe of home health care patients.

Geographic Location – 50 States and 10 DHHS Regions

The sample cases were also analyzed by state and region. As shown in Table 8.9, all states and regions were well represented. In keeping with other project statistics, the largest number of cases were collected by agencies in three states – New York, Pennsylvania and California – representing 22.6 percent of the cases. However, Region V provided the largest number of cases with almost 2,000 cases, approximately 23 percent.

Sample Cases Characteristics

The characteristics of the 8,840 research sample cases are highlighted below. Frequency distributions of all significant variables considered critical to the research and the development of the classification method are presented. Also, where appropriate, the findings are related to those described in the literature.

The socio-demographic data are described first, followed by admission and discharge data, functional status (ADL), nursing assessment of patient problems/nursing diagnoses, patient services including skilled nursing interventions, medical diagnoses or surgical procedures, and lastly visit data including the length of the episodes of home health care.

Typical Sample Patient

The majority of the sample patients in the study were white, married or widowed females, and over 70 years of age. Typically, they lived in their residences with their spouses, other family members, or friends who were considered to be available caregivers. These patients were able to comprehend and communicate and able to follow the instructions of their primary nurses, physicians and other care providers.

The majority of these patients were referred for home health care as new admissions from acute care hospitals. They were described by their primary nurse providers as motivated to get better as well as having met their care goals. These patients generally recovered or were stabilized sufficiently to be discharged to self or family when services were no longer needed.

Socio-demographics

The socio-demographic variables were collected to identify those characteristics critical to the research. Relevant and valid variables are highlighted. Their findings were used to select and categorize the variables for further analysis and for the development of the assessment instrument and classification method.

Age and Marital Status

Ages ranged from 24 to 104 years with 14 cases 100 years of age or older. Table 8.10 presents the breakdown by five year intervals of the 8,410 cases that reported their birth date. The four groups between 70 and over 85 years of age included almost 80 percent of the sample cases, with the largest group of cases between 75 and 79 years of age (21.9%).

This finding is consistent with HCFA data which showed that this age group, 75-79 years of age, received the largest number of home visits by HHAs in 1986 (Ruther and Helbing, 1988). These data are also consistent with national trends. As the number and proportion of the elderly increases, there is an increasing demand for home health services. Future projections indicate that there will be a significant increase in individuals 65 years of age and over, and in particular those 85 years of age and over, thus increasing the demand for home care services. (Rabin, 1985).

Of the 8,211 research cases that reported marital status, 89.6 percent were married (44.3%) or widowed (45.3), and 10.4 percent were either never married, separated or divorced (Table 8.11). This item by itself was not significant, because the changes in marital status that occur as an individual ages reduces the reliability of the data. When combined with the item, **living arrangement**, cases not living alone or having an available caregiver, regardless of marital status, were most likely to be recipients of home health services.

Sex and Race

The predominate characteristics of the sample cases were white females. As shown in Table 8.12, 61.7 percent were female and 85.6 percent were white. The remaining 14.4 percent non-white cases shown in Table 8.13 were predominantly black (11.2%) and Hispanic (2.6%). These findings are consistent with HCFA reports on Medicare enrollees and findings from other studies.

In one report on Medicare enrollees' home visits, 64.9 percent were female and 86.2 percent white. In another report 55.7 percent were female (Ruther and Helbing, 1988). Still another showed that 68.8 percent of those who needed home care were women, of whom 86.8 percent were white (Rabin and Stockton, 1987).

Living Arrangements and Available Caregiver

Living arrangement (Table 8.14) and available caregiver (Table 8.15) are related but were collected separately. In terms of living arrangements, 68.9 percent of the cases lived with a family member, relative or nonrelative, and 31.1 percent lived alone. This finding is similar to the 73.5 percent identified as having available caregivers.

On the other hand 31.1 percent lived alone and 26.5 percent reported self as the available caregiver. These data are consistent with other reports in the literature. According to the National Health Interview Survey (1979) 29.3% of the population lived alone and the remainder lived with a spouse, relative or nonrelative (Rabin and Stockton, 1987). It is estimated that approximately 26.4 million Americans who had their 65th birthday are living in their residences and outside of nursing homes (DHHS, 1987).

Generally, a person who lives alone without an available caregiver and requires post-hospital home health care is more likely to use other community services or be cared for in a long term care facility. Those living with spouses are more likely to use home care services.

Housing and Pets in Residence

The majority (76.4%) of research sample cases lived (Table 8.16) in detached houses, townhouses, or mobile homes; 20.6 percent lived in apartments, and the remaining 3 percent lived in rented or personal care homes. The data suggest that the beneficiaries of home health services represent, for the most part, Middle America.

Data on pets in residence (Table 8.17) were collected because of a popular belief that pets make good companions to the elderly. Data on pets are generally not found in the patient record. The findings were therefore based on questioning the primary nurse provider. A little over 20 percent (899 cases) indicated presence of a pet in the home.

Studies have shown that homebound elderly pet owners care for themselves better than non-pet owners in that they eat more regularly and keep their homes warmer. Other benefits include the opportunity for exchange of affection, distraction from one's own problems, stimulation of emotional and physical security, compensation for sensory loss, and incorporation of rhythm and structure into their daily routine (Harris and Gellin, 1990).

Comprehension Level and Communication Level

Data on comprehension levels and communication levels of the cases were collected, like the other descriptive variables, to determine if they had an impact on home health care. The findings, shown in Table 8.18, indicate that 95.5 percent of the sample cases were able to comprehend, with 22.4 percent indicating only partial comprehension. On the other hand, 97 percent, shown in Table 8.19, were able to communicate, with only 13.9 percent indicating partial communication ability.

Mental Status and Prognosis

Mental status was collected on admission of the patient to home health care. However, this variable was expanded to reflect the case's mental status most of the time during the episode of care. As shown in Table 8.20, the majority of cases, 7,533, were oriented. However, 2,647 sample cases were forgetful and 1,453 depressed.

According to a national survey, cognitive impairment increases with age. It has been reported that 20 percent of the total population 65 years of age and older suffer from mild cognitive disability. However, based on available evidence, loss of cognitive functioning is regarded as a leading cause of institutionalization including skilled nursing facilities (Rabin and Stockton, 1987). This may explain why the sample cases comprehended, communicated well and were oriented.

Prognosis of the patient is generally reported by the referring physician on the admission of a case for home health services. As shown in Table 8.21, the largest group had a fair prognosis, 48 percent, followed by good with 28.5 percent and guarded with 16.1 percent. Only 6.6 percent had a poor prognosis, when in fact over 25 percent deteriorated or died on discharge (Table 8.25). This suggests that the physician's initial assessments are generally conservative and not necessarily predictive.

Admission Status and Referral Source

Data on the admission status (Table 8.22) and referral source (Table 8.23) were collected but not used as independent variables for the classification method. However, these data provided insight into the characteristics of the home health sample cases.

The status of the cases on admission to an episode of home health care was reviewed. The majority of cases (73.4%) were new admissions for the year of the episode of care and or new to the agency. Further, 73.1 percent were direct referrals from acute care hospitals, reflecting implementation of the prospective payment system using DRGs, with cases being discharged from hospitals "quicker and sicker" (GAO/PEMD, 1985; Wood, 1985/86).

Passage of the Omnibus Reconciliation Act (Public Law 94-499) in 1980 eliminated the three-day prior hospitalization requirement. After that time referrals for home care could originate from other sources such as physicians' offices, ambulatory clinics or other out-of-hospital community sources. This change is reflected in the 26.9 percent: 14.2 percent from physician office, 4.1 percent from family or friend, and the remaining 8.6 percent from a variety of other community sources.

Discharge Status, Discharge Disposition, and Reason for Discharge

Three items were used to obtain a better understanding of the cases on discharge from an episode of care in order to identify outcome measures. As shown in Table 8.24, of the 8,713 cases that reported discharge status, 52.5 percent recovered or improved, 22.4 percent showed no change or stabilized, and 25.1 percent deteriorated or died in home or hospital.

The second item addressed discharge dispositions. As shown in Table 8.25, the majority of cases (65.2%) were discharged to self or family. This finding reinforced the third item on reason for discharge which showed that services were no longer needed on discharge for 64.8% of the cases (Table 8.26).

However, as shown in Table 8.25, 34.8 percent of the cases were discharged to other community health agencies. A large number of cases (14.7%) were admitted or readmitted into the hospital, 3.5 percent to a nursing home, and the remaining 16.6 percent to other community agencies or programs, such as hospice agencies for terminal cases or health supervision programs for chronic cases.

These data suggest that for two thirds of the cases, the referral to home health care was appropriate and patient outcomes were favorable. However, for the remaining one third, the majority (14.7%) fell into the group of prematurely hospital discharged, "quicker and sicker", and required hospital readmissions. Whereas for the remainder of the cases, home health care was the interim setting between short term acute hospital care and long term care placement such as skilled nursing facility. These findings contributed to the conceptualization of the cohort model described in the Predictive Findings, Chapter 9.

Goals and Motivation

Two additional items were included in an attempt to measure outcomes based on the interview of the primary nurse provider of the case. The first addressed whether the patient's goals of home health care were met or not, and if not the reason why. The second addressed whether the patient was motivated to get better during the episode of home health care.

The responses provided questionable results since they were based on subjective recall. The findings shown in Table 8.27, indicated that for 56.4 percent of patients met, 30.2 percent partially met and 10.4 did not meet their goals of care. These findings were reinforced by those reported for the motivation question. As shown in Table 8.28, 60.4 percent of the patients were considered to be motivated, 24.7 partially motivated and 7.5 percent not motivated to get better.

Functional Status

Functional status was considered to be a logical predictor of resource requirements for home health care and a critical variable for the classification method. Functional status includes measures that assess the ability to perform basic activities of daily living (ADLs) as well as other activities that measure the ability to perform more complex tasks associated with an independent life style (IADLs).

There was no consensus on what specific functional status variables were predictors of resource requirements in home health care. If the functional status data were not found in the patient record, then they were obtained by questioning the primary skilled nurse provider. Nine functional activities were selected and collected for each case on admission and on discharge for an episode of home health care.

The nine functional status variables consisted of Katz's Index of ADL -- six functional variables: (a) bathing, (b) dressing, (c) toileting, (d) transfer, (e) continence, and (f) feeding. They also included the variable (g) walking or mobility, which was considered by Katz to be critical in home care. And finally, they included two IADLs based on clinical judgement (h) using the telephone and (i) managing medications, which were selected from Lawton's scale of eight so-called instrumental activities of daily living (IADLs) (Katz, 1983).

Analysis of these activities was conducted to indicate progression, regression or stabilization for each case. Three levels of performance were collected with scores for each activity. They included: (a) one point for independent (able to perform), (b) two points for assistance of person/device, and (c) three points for dependent (unable to perform). A combined score of all nine variables provided a range of 9 to 27. This new scale -- Georgetown University activities of daily living scale (GU ADL) -- was considered to be a potentially useful scale for the home health assessment instrument.

Initial analysis focused on the frequency distributions for each of the nine functional variables on admission and discharge by the three levels of performance. According to Katz (1963), the Index of Independence in ADL is based on independence of an activity without assistance or supervision of a person or device.

Frequencies of Levels of Performance

Frequency distributions were prepared for the three levels of performance on admission and discharge for each of the nine variables. As shown in Table 8.29, the independent and assistance levels of performance for all activities improved from admission to discharge, whereas the dependent levels changed only minimumlly. Independent levels of performance for at least six activities improved significantly, ranging from 10 to 20 percent. These six activities were: (a) bathing, (b) dressing, (c) toileting, (d) transfer, (e) walking, and (f) managing medications. However, three activities: (a) continence, (b) feeding and (c) using telephone improved only marginally. When comparing the dependent levels of performance, the changes were not as significant since several activities changed to the need for assistance performance level.

Functional Status Scales

The nine functional activities were also analyzed using five different combinations and scales based on a review of the literature. They include: (a) Katz ADL Index with six activities, (b) Katz ADL Index for home care with seven activities, (c) RUGs ADL with four activities, (d) IADL with two activities, and (e) GU ADL Scale with the nine variables. The scales are shown in detail in Figure 8.1, and are scored as follows:

- Georgetown GU ADL Scale: nine variables with a score that ranged from 9 to 27.
- Katz ADL Index: six variables with a score that ranged from 0 to 6.
- Katz ADL Index for Home Care: seven variables (included walking) with a score that ranged from 0 to 7.
- RUGS ADL Scale: four variables with a score that ranged from 3 to 10.
- IADL Scale with two variables with a score that ranged from of 0 to 6.

The GU ADL Scale, the Katz Index, and Katz Index for home care, and the IADL Scale have been described. However, RUGs ADL Scale is one that has been described in the literature as having implications for home health care. It consists of three activities, each with three functioning levels, and one additional point for a feeding procedure. They are: (a) toileting with a score of 1 - 3, (b) eating with a score of 1 - 3, and a 4th point for tube or parenteral feeding, and (c) transfer with a score of 1 - 3. The construction of the RUGs ADL Index was formed by adding the scores which range from 3 to 10 .

Frequencies of Functional Status Scales

A comparison of the frequencies and mean scores was made of the five scales shown in Table 8.30. These distributions clearly indicated that the traditional ADL scales were not as relevant as the combined variables used in the GU ADL Scale which has a mean of 14.59. The RUGs ADL had the next highest mean. Based on this comparison, the low means of the Katz ADL Index of six, the Katz ADL for home care of seven, and the IADL Scale of two variables were dropped. However, RUGs ADL and GU ADL Scales were considered relevant and selected for the further analysis as possible predictor variables.

A final comparison was made of the number and percent distributions for the GU ADL Scale. The possible scores for all sample cases ranged from 9 to 27. As shown in Table 8.31, the largest number of cases totaled 763 (9.9%) with an average score of 14. On discharge the scores were completely different, that is the largest number of cases (1,260 representing 17%) had a score of 10, which was almost independent. However, when the scores were compared from admission to discharge, 50.9 percent had no change and of the remaining 49.1 percent, over 40 percent did not improve and may have deteriorated. These findings have to be viewed as guarded since they were not always recorded in patients' records and were based on the questioning of the primary nurse provider. Further study is needed on the GU ADL Scale.

Nursing Diagnoses

Nursing diagnoses and/or patient problems, as assessed by skilled nursing providers, were viewed in this research as critical measures for predicting resource requirements and therefore essential for the development of the classification method. Status of the nursing diagnoses on discharge when compared to the nursing diagnoses on admission was also considered as expected outcome measures for evaluating home health care.

A nursing diagnosis is a clinical judgement about human responses to health problems for which the nurse is legally accountable and for which the nurse can order definitive interventions (Carpenito, 1989). Generally, nursing diagnoses are made by the primary nurse provider as part of the admission assessment. Reassessments are made during the episode of care and their statuses are evaluated on discharge.

All nursing diagnoses were collected for an entire episode of home health care for each sample case. They were recorded as narrative descriptions and were manually coded using an adapted version of the Nursing Diagnosis Taxonomy I (Fitzpatrick et al., 1989), which consisted of one hundred forty-seven nursing diagnoses, of which forty-two represented major categories (two digit codes) and one hundred five subcategories (three digit codes). The discharge status for each nursing diagnosis was also collected and coded using one of five outcome measures: (a) **Resolved**, (b) **Improved**, (c) **No Change**, (d) **Stabilized/Maintained**, and (e) **Deteriorated/Worse**. The discharge status, when not found in the patient record, was based on the questioning of the primary nurse provider.

A total of 40,361 nursing diagnoses were obtained from the 8,840 patient records of cases. This is the largest volume of nursing diagnoses data ever collected on cases receiving home health care. Since the existing methodologies utilizing nursing diagnosis described in the literature did not focus on home health care, several different statistical strategies were needed and designed to analyze these data.

This section not only describes the strategies used for analyzing the nursing diagnoses data, but also presents their descriptive findings. The findings were in turn evaluated to determine which combinations were the most relevant and could be used as predictors of resource requirements.

Frequencies of Nursing Diagnoses

Frequency distributions were prepared for several different lists of nursing diagnoses using the 40,361 collected from the sample cases. They were designed in order to determine which list was the most relevant to use as predictors of care requirements.

Frequencies for the largest and most detailed list of one hundred forty-seven nursing diagnoses (two and three digit codes) were analyzed first and are shown in Table 8.32. Eleven nursing diagnoses had the largest frequencies ranging from 1,000 to 2,000 nursing diagnoses whereas eleven nursing diagnoses were not used. The three largest number of nursing diagnoses were: (a) **knowledge deficit re medications** with 2,037 (5.1%), (b) **physical mobility, impaired** with 1,973 (4.7%), and (c) **cardiac output, altered** with 1,819 (4.5%).

A second list of the forty-two nursing diagnoses major categories was analyzed next. It collapsed the one hundred-five subcategories (three digit codes) with the forty-two major categories. The three nursing diagnoses, shown in Table 8.33, with the largest frequencies were: (a) **knowledge deficit** with 7,217 (17.9%), (b) **altered tissue perfusion** with 5,825 (14.5%), and (c) **altered activity** with 3,832 (9.5%). Two of these nursing diagnoses -- **knowledge deficit** and **altered activity** -- were the same two most frequent nursing diagnoses on the detailed list. However, **altered tissue perfusion** was a new nursing diagnosis major category which encompassed all the different body systems and disease condition problems.

Because **altered perfusion** had such a large number, it required further analysis to determine the significance of the frequency and nature of the category. Tissue perfusion encompassed nine subcategories representing different body system conditions. Each of these were reviewed and added to the list of forty-two making a new list of fifty-one (51) nursing diagnoses expanded major categories. This revised list was also analyzed to determine in the degree of relevance of these nine additional codes. Table 8.34 presents these frequencies which essentially did not provide any significant new findings.

Counts of Nursing Diagnoses

The actual number of nursing diagnoses for each sample case was also investigated for the list of the one hundred forty-seven nursing diagnoses. As shown in Table 8.35, the counts per case ranged from 1 to 19 per case with the largest number (1,518) having three nursing diagnoses per case representing 17.2 percent of the total sample cases.

On the other hand, counts for the list of forty-two major categories of nursing diagnoses codes shown in Table 8.36 ranged from 1 to 17 per case and with the largest number (1,812) having two nursing diagnoses per case representing only 20.5 percent of the sample cases. Whereas, the counts for the list of fifty-one (51) nursing diagnoses expanded major categories shown in Table 8.37 ranged from 1 to 17 per case with the largest number (1, 716) having three per case and representing 19.4 percent of all the cases. These findings highlight the fact that skilled nurses assess, for each case admitted for home health care, at least **three** nursing diagnoses or patient problems as requiring nursing care.

Nursing Diagnoses Patterns

Based on the literature and review by nursing diagnoses experts data were analyzed further by aggregating the 40,361 into the nine human response patterns (Fitzpatrick et al., 1989) and eleven functional health patterns (Gordon, 1982). The major problem with these similar strategies was the fact that when a case had multiple codes in the same category they were counted only once. As a result the magnitude of assessed conditions was diminished since in both schemes the category groups were not unique and contained too many diagnoses.

The nine human response patterns were designed to classify the nursing diagnoses labels based on a theoretical framework (NANDA, 1989). The frequencies are shown in Table 8.38. The **exchanging pattern** had the largest number of nursing diagnoses, with 50.5 percent representing 88.8 percent of all cases. This pattern encompasses almost half of the most common nursing diagnoses making it clinically impractical to use the list of nine human response patterns as a predictor of nursing care requirements. Also shown in Table 8.39 are the counts for the 8,840 cases. They ranged from 1 to 8 nursing diagnoses human response patterns with the largest number (3, 150) having two per case.

The eleven functional health patterns were also designed to categorize nursing diagnostic labels as an indexing system (Gordon 1982). The nursing diagnoses were also aggregated using the eleven functional health patterns. As shown in Tables 8.40 the largest functional health pattern was **activity - exercise pattern** with 39.4 percent representing 81.4 percent of cases. This functional health pattern encompassed approximately 15 of the most common nursing diagnoses, making the significance of this finding also difficult to evaluate. In further analysis of this grouping the next two frequent patterns were **sleep - rest pattern** and **nutritional - metabolic pattern**, neither of which were significantly represented on any of the lists of nursing diagnoses previously used. As shown in Table 8.41, the counts are also presented for the 8,840 cases. They ranged from 1 to 9 with the largest number (2,745) having two per case.

In comparing the two nursing diagnosis schemes the eleven functional health patterns had more relevance than the nine human response patterns. However, neither groups of patterns were considered to be statistically or clinically significant, and therefore it was determined that neither list could be used to predict resource requirements.

Nursing Diagnosis Home Health Care (HHC) Components

A final list was designed using the hypothesis that nursing diagnoses could be used to predict resource requirements for home health care. Based on the actual frequencies, the nursing diagnoses were aggregated into twenty (20) components of home health care which grouped together like nursing diagnoses. The underlying rationale was that nursing diagnoses are used as a basis for planning nursing care including nursing interventions during an episode of home health care. Based on professional knowledge they are assessed by the primary nurse provider as those requiring care and are significant in predicting care requirements.

This final list of twenty (20) nursing diagnosis home health care (HHC) components was derived from the actual 40,361 nursing diagnoses. They focused on home health care requirements and could be mapped to the 22 nursing intervention HHC components. Table 8.42 presents the frequencies of the 20 nursing diagnosis HHC components. The three most frequent nursing diagnosis components were **cognitive component** with 21.9 percent, representing 52.1 percent of the cases; **activity component** with 11.5 percent, representing 42.3 percent of the cases; and **tissue skin integrity component** with 9.1 percent, representing 36.6 percent of the cases. All twenty (20) nursing diagnoses components were well represented on this list.

Two of the three most frequent nursing diagnoses found on the detailed list of one hundred forty-seven were on this regrouped list. The **cognitive component** encompassed **knowledge deficit** and the **activity** component encompassed **impaired physical** mobility. These comparisons reinforced the selection of this list of twenty (20) nursing diagnosis HHC components as being the most precise of all those analyzed. This new list of nursing diagnosis HHC components was deemed to be clinically significant and was selected to be used as a predictor of home care resource requirements.

The counts of the twenty (20) nursing diagnoses components were also analyzed. As shown in Table 8.43, they ranged form 1 to 14 with the largest number (1,800) having three nursing diagnosis components per case, representing 20.4 percent. These findings were consistent with those of the detailed list of one hundred forty-seven nursing diagnoses.

Nursing Interventions

Patient services provided by skilled nurse providers were also viewed in this research as critical measures for predicting resource requirements and therefore essential for the development of the classification method. They were collected as a measures of actual resource use. The type of nursing intervention can also be considered as a measure for predicting resource requirements.

Patient medical orders (services) are usually initiated by the referring physician on admission to a home health agency for care. The medical orders are generally reviewed by the primary nurse provider during the initial home assessment visit to ascertain their frequency and duration as required by the Medicare regulations. As part of the initial assessment the patient problems, i.e. nursing diagnoses, are also determined along with the plan of nursing care in order to carry out the medical and nursing orders.

The patient services were collected for an entire episode for home health care for all sample cases. This included all services (significant treatments, activities, and interventions) provided on all home visits by all nursing providers that were documented in the patient record. The skilled nursing services were collected on the Abstract Form, not only as the HCFA treatment codes (A1-A27) (Appendix 6.1), but also as narrative descriptions not listed on the HCFA treatment code list, which had to be manually coded. The skilled nursing textual data codes were combined with HCFA skilled nursing treatment codes.

The specially designed nursing intervention coding scheme, which was developed specifically for this research is described in the section on Data Processing. It consists of one hundred sixty-six (166) nursing interventions, fifty-six (56) of which are major categories (two digit codes) and one hundred ten are subcategories (three digit codes). A fourth prefix digit was also used as a suffix to code the four types of nursing actions: (a) **Assess**, (b) **Care**, (c) **Manage** and (d) **Teach**. This fourth digit expanded the list to 664 possible nursing interventions.

A total of 80,283 nursing interventions were collected from the 8,840 patient records of cases for the research project. This is the largest volume of nursing services data ever collected on cases receiving home health care. Like nursing diagnoses, there were no research methodologies utilizing nursing interventions found in the literature or studies conducted that have analyzed such large a volume of home health nursing data. As a result, several statistical strategies were needed and designed to analyze these data.

This section describes the strategies used for analyzing the nursing interventions data and presents their descriptive findings. The findings were evaluated to determine which combinations were the most relevant as predictors of resource requirements.

Frequencies of Nursing Interventions

Frequency distributions were prepared for several different lists of nursing interventions using the 80,283 collected from the research sample cases. The distributions were designed to determine which list of variables was the most relevant and at the same time useable to predict care requirements.

The largest and the detailed list of one hundred sixty-six (166) nursing interventions was analyzed first. Their frequencies are presented in Table 8.44. As noted the five nursing interventions with the largest frequencies were **medication administration** with 5.7 percent, **cardiopulmonary care** (4.5%), **nutritional care** (4.6%) **restorative care** (3.5%) and **wound care** (3.0%).

Almost all of these nursing interventions were related to the nursing diagnoses most frequently reported. For example, the nursing diagnosis **knowledge deficit** re **medications** was assessed as requiring the nursing intervention **medication administration**; the nursing diagnosis **physical mobility, impaired** was assessed as requiring **restorative care** or exercises; and the nursing diagnosis **tissue integrity altered** was assessed as requiring the nursing intervention **wound care**. These examples illustrate the nursing process that is used when planning nursing care of home health patients.

A second list of fifty-six (56) nursing intervention major categories (two digit) was analyzed next. It collapsed the one hundred ten subcategories (three digit codes) with the fifty-six (56) major categories. The frequency distributions shown in Table 8.45 identified the same four nursing interventions -- **medication administration, nutritional care, restorative care** and **wound care**. They continued to have the largest frequencies. However the fifth lowest frequent **body system condition care**, was listed which encompasses **cardiopulmonary care** reported on the detailed list.

When the detailed list of one hundred sixty-six (166) nursing interventions was expanded with four types of nursing actions coded as prefixes, six hundred sixty-four (664) possible nursing interventions emerged. The five most frequent nursing interventions were **TEACH medication administration** with the highest frequency of 4.7, percent, followed by **ASSESS cardiopulmonary status** (3.6 %), **TEACH nutritional care** (2.3 %), **provide restorative CARE**, and **ASSESS and provide wound CARE**. These types of actions expanded the scope of the nursing intervention and provided additional information about the levels of care.

Counts of Nursing Interventions

The actual number of nursing interventions for each sample case was also investigated for the lists of one hundred sixty-six (166) and fifty-six (56) nursing interventions. As shown in Table 8.46, the counts per case for the list of one hundred sixty-six (166) nursing interventions ranged from 1 to 42 per case with the largest number (770) having three nursing interventions per case, and the list of fifty-six (56) nursing interventions, shown in Table 8.47, ranged from 1 to 25 per case with the largest number (949) with three nursing interventions per case.

These findings were similar to those obtained for the nursing diagnoses in that regardless of which coding list was used, an average of **three** nursing interventions per case was found.

Nursing Interventions Home Health Care Components

The analyses of these three different groupings of the nursing intervention scheme did not produce significant findings, probably because the coded lists were too long. It was concluded that they should be grouped into a manageable list that would allow for meaningful analysis. After consultation from several classification experts, the original list of one hundred sixty-six (166) nursing interventions was aggregated based on actual frequencies and mapped to the twenty (20) home health care nursing diagnosis components. The final list of twenty-two (22) nursing intervention home health care (HHC) components was developed.

The twenty-two (22) nursing intervention components are listed in Table 8.48 with their frequencies. Based on the list of one hundred-sixty-six nursing interventions, three of the five largest frequencies were equal. They were -- **medication administration, nutritional care,** and **cardiopulmonary care.** The two nursing intervention components -- **physical regulation care** and **health behavior care** -- emerged as new interventions that were significant when grouped.

The counts of the twenty-two (22) nursing intervention components were also analyzed. As shown in Table 8.49, they ranged from 1 to 19 with the largest number (1014) having five nursing interventions per case, representing 11.5 percent. These findings were consistent with other analyses.

The major purpose for determining a meaningful list of nursing interventions was to use them as indicators of resource requirements. Nursing services are in fact the major reasons for providing home health care. The list of twenty-two (22) components proved to be not only manageable and clinically significant, but also an effective measure of resource use and was therefore selected for predicting resource requirements. The list was further analyzed as is described in the Predictive Findings, Chapter 9.

Medical Diagnoses or Surgical Procedures

The primary medical diagnosis and/or surgical procedure were collected for each case for the episode of care. A medical diagnosis or surgical procedure is required for a Medicare patient to be admitted for home health services and for reimbursement by Medicare. The primary condition and four other pertinent diagnoses were collected, however, only the primary reason was analyzed.

Medical diagnoses or surgical procedures data were less complex to analyze because only one entry was used per case whereas nursing diagnoses or nursing interventions required analyzing multiple entries for each case. These variables were recorded on the Abstract Form using the ICD-9-CM codes. The four other pertinent diagnoses were also collected, but were not analyzed due to the sheer volume of data and the numerous combinations that were present.

The medical diagnosis or surgical procedure frequencies were sorted by primary diagnosis or surgical procedure for the episode of home health care. A total of 2,866 surgical procedures, 8,742 medical diagnoses and 8,801 combined medical diagnoses or surgical procedures were analyzed. These were initially tabulated by individual ICD-9-CM codes and then summarized into the 32 major diagnosis groups (17 major headings for medical diagnoses and 15 major headings for surgical procedures). They were finally refined and aggregated by their actual frequencies. As a result twenty (20) groups were developed that encompassed the most frequent surgical procedures and medical diagnoses according to the body systems.

The fifty most frequent medical diagnoses and surgical procedures were sorted by descending order of frequency (Table 8.50) as well as by their ICD-9-CM code numbers (Table 8.51). These lists combined both medical diagnoses and surgical procedures (operations) together. These tables revealed the wide range of medical conditions seen in home health care and the important role of surgical procedures. As shown in Table 8.50, the summary of combined conditions sorted by frequency highlighted the key role of **cardiovascular, respiratory, neoplastic,** and **endocrine conditions** as the four leading areas in that order. **Musculoskeletal procedures** and **digestive procedures** were most frequent with **cardiovascular, respiratory,** and **urinary conditions**. These findings are all consistent with the age distribution of the population.

Table 8.50 also showed the detail for these conditions. Congestive Heart Failure (CHF), Cerebrovascular Accidents (CVA), Chronic Obstructive Pulmonary Disease (COPD), Pneumonia, and Hypertension were the leading medical diagnoses. Decubitus Ulcer, Diabetes, and Myocardial Infarction are also part of the top 10 codes. Ophthalmologic procedures are common and a wide variety of digestive system surgical procedures account for this important component of home health care.

The patterns of medical diagnoses and surgical procedures did not reveal any surprises regarding the content of home health care. The study population included many different medical diagnoses and surgical procedures. The diversity of medical problems and variations in coding did not suggest any simple classification scheme. The limited number of medical diagnoses and surgical procedures which occurred with sufficient frequency represented a reasonable cohort of patients. These conditions such as CHF and CVA are highly variable in their medical severity and presentation, and even more variable in their home health care requirements which relate more to specific patient problems than to the medical management of these conditions.

In general, there were too many different medical conditions to form a useful classification scheme with a limited number of reasonably homogeneous categories, hence the twenty (20) ICD-9-CM major section headings groups were used as the best possible medical classification scheme. The conditions with the highest frequencies were those with variation in severity, medical care requirements, and home health care requirements. The list of twenty (20) groups was selected for the predictive analysis and is described in Chapter 9.

Home Health Visits

Home health visits were viewed in this research as critical indicators of resource use and therefore were essential data for the development of the classification method. They were viewed similarly to days of care using DRGs in acute care hospitals.

The findings when compared to those reported in the literature were different, since most studies did not collect data on the number of visits and the length of the episodes of home health care. A 1985 report by the National Association for Home Care suggested that there were no valid and reliable methods for measuring resource use in the home health industry. As a result the findings in this research represent new information on the largest number of visit data collected on Medicare recipients of home health care.

The home health visit variables were used as measures of resource use and considered to be dependent variables based on the pilot study findings, review of the literature, recommendations from home health nursing experts, and researchers in the field. The visit information consisted of two types of data: (a) number of visits and (b) length of episodes of care.

Number of Home Health Visits

The frequency distributions of the 180,607 home health visits for all 8,691 sample cases were analyzed according to the six home health providers which are reimbursed by Medicare. The mix of home health providers is generally influenced by the referring physician and by the primary nurse provider who assesses the care requirements for a patient on admission to home health care. Visit data collected in this study included home health visits provided by: (a) skilled nurses, (b) physical therapists, (c) occupational therapists, (d) speech therapists, (e) medical social workers, and (f) home health aides.

Provider Visits

A calendar was provided to collect the actual dates of the visits by each of the six types of providers. As previously indicated cases without any nursing visits were excluded from the study. The frequency distributions are presented for each of the six providers by individual provider visits and/or groups of visits as deemed appropriate.

Skilled Nursing Visits

The skilled nursing visits were hypothesized to be the most predictive of the resources used and are descriptive of the services provided. As shown in Table 8.52, 47.6 percent of the 8,691 cases received 1 to 7 visits, representing almost half of all the cases, 28.7 percent received 8 to 14 visits, representing one quarter of all the cases, and the remaining quarter consisted of 18.7 percent which received 15 to 34 visits and 5 percent received 35 to 194 visits.

Home Health Aide Visits

The second largest number of home visits was made by the home health aide. The frequencies presented in Table 8.53 indicate that half of the cases received 1 to 9 visits, and the remaining cases received 10 to 69 visits. Over half (61.3 %) of the cases did not receive any home health aide visits.

Other Professional Providers Visits

The third largest number of visits were made by the physical therapists. As shown in Table 8.54, approximately half of the 1,863 cases received 1 to 6 visits, whereas the remaining half received 7 to 47 visits. Over three fourths (78.5%) of the sample cases did not receive any physical therapy visits. Analysis of the medical social worker visits (Table 8.55) showed that only 12.8 percent of the cases received any visits. The 1,104 cases who received visits had from 1 to 10 home visits. Tables 8.56 and 8.57 show that only 4.3 percent received occupational therapy visits and 2.2 percent speech therapy visits.

Mean Visits

The number visits by each of the providers was also analyzed to determine the average number of visits per provider. As shown in Table 8.58, the highest average mean number of skilled nursing visits was 11.7, as compared to 6.06 for home health aide. Other combinations of provider visits were calculated and their means and standard deviations are shown in Table 8.59.

Based on these findings two dependent variables were selected for further analyses as measures of resource use. They included: (a) the nursing visits with a mean of 11.7, and (b) all provider (weighted) visits with a mean of 18.2. The variable included home health aide visits which were weighted to reflect two-thirds of a visit, since a home health aide visit costs approximately two-thirds that of the other professional providers).

Length of Episodes of Care

It was hypothesized that the episode lengths could be clustered by the type of case or patient condition. Episode lengths were calculated from the number of days from first to the last visit, instead of the number of days from the admission to the discharge date. The visit dates were considered to be more reliable than admission and discharge dates because of the varying methods used by HHAs to open and close a case.

The frequency distributions of visits were analyzed regardless of provider type from the first to the last visit date. Table 8.60 provides a breakdown of the frequency distributions for these 8,691 sample cases. They were grouped by 5, 10, 50, 100 or more day intervals. The most significant finding was that 49.1 percent of the sample nursing cases has episodes less than thirty (30) days. However, when the sixty (60) day intervals were analyzed (Table 8.61), 78.3 percent of the cases were under sixty (60) days, 92.1 percent under one hundred twenty (120) days, and 95.9 under one hundred eighty (180) days. Only one percent had of the cases ranged from approximately one year to two years in length.

Cohorts

A comparison of the visit frequencies by all providers to the length of the episodes of care is shown in Table 8.61. Almost 50 percent of all home visits were under thirty (30) days, and over 75 percent were under sixty (60) days. The remaining 25 percent included home visits that ranged from sixty (60) days to over one year in length. Based on the analysis of the length of the episodes of home health care by days, they were grouped into three distinct cohorts: (a) short term cases (under 30 days), (b) intermediate cases (30 to 120 days, and (c) long term cases (over 120 days) (Table 8.62).

Table 8.1

Comparison of national sample agencies with HCFA Medicare certified HHAs: Staff size

Agency size FTE RNs	National sample Number	 Percent	Certified HHAs Number	 Percent
Total	646	100.0	5767[1]	100.0
1 to < 5	126	19.5	3514	60.9
5 to < 14	242	37.5	1646	28.5
14 to < 65	213	33.0	543	9.4
65 and over	18	2.7	64	1.1
Unknown	47	7.2	–	–

Source: HCFA MMACS, 1986.

1/ Excludes 113 HHAs with less than one FTE RN

Table 8.2

Comparison of national sample agencies with HCFA Medicare certified HHAs: Type of ownership

Agency type ownership	National sample Number	 Percent	Certified HHAs Number	 Percent
Total	646	100.0	5767[1]	100.0
Voluntary/ VNA	145	22.4	497	8.6
Hospital Based	148	23.0	1502	26.1
Official/ Comb.	112	17.3	1183	20.5
Private/Proprietary	202	31.3	2585	44.8
Unknown	39	6.0	–	–

Source: HCFA MMACS, 1986.

1/ Excludes 113 agencies with less than one FTE RN

Table 8.3

Comparison of national sample agencies with HCFA Medicare certified HHAs: Four regions

Region	National sample Number	National sample Percent	Certified HHAs Number	Certified HHAs Percent
Total	646	100.0	5767[1]	100.0
North	192	29.7	1199	20.8
South	167	25.9	2050	35.5
Midwest	192	29.7	1675	29.0
West	95	14.7	843	14.6

Source: HCFA MMACS, 1986.

1/ Excludes 113 agencies with less than one FTE RN

Table 8.4

Frequency distributions of national sample home health agencies: State

State name	Number	Percent
Total	646	100.0
Alaska	2	0.3
Alabama	24	3.7
Arkansas	5	0.8
Arizona	12	1.9
California	37	5.7
Colorado	6	0.9
Connecticut	10	1.5
Dist. of Col.	2	0.3
Delaware	2	0.3
Florida	30	4.6
Georgia	14	2.2
Hawaii	1	0.2
Idaho	4	0.6
Illinois	26	4.0
Indiana	16	2.5
Iowa	19	2.9
Kansas	7	1.1
Kentucky	12	1.9
Louisiana	4	0.6
Massachusetts	19	2.9
Maryland	8	1.2
Maine	2	0.3
Michigan	26	4.0
Minnesota	18	2.8
Missouri	15	2.3
Mississippi	18	2.8
Montana	4	0.6
North Carolina	16	2.5
North Dakota	3	0.5
Nebraska	6	0.9
New Hampshire	7	1.1
New Jersey	21	3.3
New Mexico	3	0.5
Nevada	4	0.6
New York	51	7.9
Ohio	35	5.4
Oklahoma	2	0.3
Oregon	2	0.3

Table 8.4 (cont.)

Frequency distributions of national sample home health agencies: State

State name	Number	Percent
Pennsylvania	47	7.3
Puerto Rico	3	0.5
Rhode Island	3	0.5
South Carolina	9	1.4
South Dakota	3	0.5
Tennessee	13	2.0
Texas	17	2.6
Utah	4	0.6
Virginia	12	1.9
Vermont	3	0.5
Washington	10	1.5
West Virginia	2	0.3
Wisconsin	24	3.7
Wyoming	3	0.5

Source: HCFA MMACS, 1986.

Table 8.5

Comparison of national sample agencies with HCFA certified HHAs: States and Regions

Region/state	Number	Certified HHAs	Percent
Total	646	5984	10.8
Region I	**44**	**350**	**12.6**
Connecticut	10	113	8.8
Maine	2	16	12.5
Massachusetts	19	148	2.9
New Hampshire	7	40	1.1
Rhode Island	3	13	0.5
Vermont	3	20	0.5
Region II	**75**	**257**	**11.7**
New Jersey	21	62	3.3
New York	51	154	7.9
Puerto Rico	3	40	0.5
Region III	**73**	**633**	**11.3**
Delaware	2	29	0.3
District of Columbia	2	9	0.3
Maryland	8	96	1.2
Pennsylvania	47	292	7.3
Virginia	12	156	1.9
West Virginia	2	51	0.3
Region IV	**136**	**1107**	**21.1**
Alabama	24	124	3.7
Florida	30	177	4.6
Georgia	14	73	2.2
Kentucky	12	96	1.9
Mississippi	18	135	2.8
North Carolina	16	115	2.5
South Carolina	9	44	1.4
Tennessee	13	343	2.0

Table 8.5 (cont.)

Comparison of national sample agencies with HCFA certified HHAs: States and Regions

Region/state	Number	Certified HHAs	Percent
Region V	**145**	**1195**	**22.4**
Illinois	26	273	4.0
Indiana	16	139	2.5
Michigan	26	188	4.0
Minnesota	18	186	2.8
Ohio	35	251	5.4
Wisconsin	24	158	3.7
Region VI	**31**	**1013**	**4.8**
Arkansas	5	155	0.8
Louisiana	4	172	0.6
New Mexico	3	49	0.5
Oklahoma	2	150	0.3
Texas	17	487	2.6
Region VII	**47**	**550**	**7.2**
Iowa	19	163	2.9
Kansas	7	134	1.1
Missouri	15	207	2.3
Nebraska	6	46	0.9
Region VIII	**23**	**254**	**3.6**
Colorado	6	113	0.9
Montana	4	30	0.6
North Dakota	3	31	0.5
South Dakota	3	24	0.5
Utah	4	27	0.6
Wyoming	3	29	0.5
Region IX	**54**	**467**	**8.4**
Arizona	12	72	1.9
California	37	362	5.7
Hawaii	1	14	0.2
Nevada	4	18	0.6

Table 8.5 (cont.)

Comparison of national sample agencies with HCFA certified HHAs:
States and Regions

Region/state	Number	Certified HHAs	Percent
Region X	**18**	**158**	**2.7**
Alaska	2	6	0.3
Idaho	4	31	0.6
Oregon	2	66	0.3
Washington	10	55	1.5

Source: HCFA list of Medicare certified agencies, 1986.

Table 8.6

Comparison of the sample cases with the national sample HHAs: Staff size

Agency size FTE RNs	Sample cases Number	 Percent	National sample Number	 Percent
Total	8840	100.0	646	100.0
1 to < 5	1363	15.4	126	19.5
5 to < 14	3298	37.3	242	37.5
14 to < 65	3302	37.4	213	33.0
65 and over	448	5.1	18	2.7
Unknown	429	4.8	47	7.2

Table 8.7

Comparison of the sample cases with the national sample of HHAs: Type of agency ownership

Agency type Ownership	Sample cases Number	 Percent	National sample Number	 Percent
Total	8840	100.0	646	100.0
Voluntary/ VNA	2334	26.4	145	22.4
Hospital-Based	1912	21.6	148	23.0
Official/ Comb.	1279	14.5	112	17.3
Private/Proprietary	2956	33.4	202	31.3
Unknown	359	4.1	39	6.0

Table 8.8

Comparison of the sample cases with the national sample HHAs:
Four regions

Region	Sample cases Number	 Percent	National sample Number	 Percent
Total	8840	100.00	646	100.0
North	2572	29.1	192	29.7
South	2121	24.1	167	25.9
Midwest	2665	30.2	192	29.7
West	1482	16.8	95	14.7

Table 8.9

Number and percent distribution of sample cases:
State and region

Region/state	Number	Percent
Total	8840	100
Region I	**536**	**6.0**
Connecticut	108	1.2
Maine	35	0.4
Massachusetts	202	2.3
New Hampshire	101	1.1
Rhode Island	70	0.8
Vermont	20	0.2
Region II	**1003**	**11.3**
New Jersey	249	2.8
New York	732	8.3
Puerto Rico	22	0.2
Region III	**1033**	**11.8**
Delaware	25	0.3
District of Columbia	50	0.6
Maryland	97	1.1
Pennsylvania	634	7.2
Virginia	192	2.2
West Virginia	35	0.4
Region IV	**1645**	**18.7**
Alabama	176	2.0
Florida	373	4.2
Georgia	247	2.8
Kentucky	164	1.9
Mississippi	213	2.4
North Carolina	228	2.6
South Carolina	95	1.1
Tennessee	149	1.7

Table 8.9 (cont.)

Number and percent distribution of sample cases:
State and region

Region/state	Number	Percent
Region V	**2038**	**23.0**
Illinois	419	4.7
Indiana	203	2.3
Michigan	458	5.2
Minnesota	171	1.9
Ohio	456	5.2
Wisconsin	331	3.7
Region VI	**476**	**5.4**
Arkansas	67	0.8
Louisiana	56	0.6
New Mexico	43	0.5
Oklahoma	17	0.2
Texas	293	3.3
Region VII	**627**	**7.2**
Iowa	217	2.5
Kansas	95	1.1
Missouri	236	2.7
Nebraska	79	0.9
Region VIII	**341**	**3.9**
Colorado	95	1.1
Montana	54	0.6
North Dakota	27	0.3
South Dakota	30	0.3
Utah	104	1.2
Wyoming	31	0.4
Region IX	**835**	**9.4**
Arizona	155	1.8
California	632	7.1
Hawaii	10	0.1
Nevada	38	0.4

Table 8.9 (cont.)

Number and percent distribution of sample cases: State and region

Region/state	Number	Percent
Region X	**306**	**3.5**
Alaska	19	0.2
Idaho	97	1.1
Oregon	15	0.2
Washington	175	2.0

Table 8.10

Number and percent distributions of cases: Age groups

Age group	Number	Percent
Total	8,410	100.0
Less than 65	525	6.2
65-69	1,210	13.5
70-74	1,674	19.8
75-79	1,843	21.9
80-84	1,621	19.3
85 and over	1,537	18.3

Table 8.11

Number and percent distributions of cases: Marital status

Marital status	Number	Percent
Total	8,211	100.0
Married	3,638	44.3
Widowed	3,721	45.3
Divorced	283	3.4
Never married	515	6.3
Separated	54	0.7

Table 8.12

Number and percent distributions of cases: Sex

Sex	Number	Percent
Total	8,833	100.0
Male	3,383	38.3
Female	5,450	61.7

Table 8.13

Number and percent distributions of cases: Race

Race	Number	Percent
Total	8,118	100.0
White	6,952	85.6
Black	910	11.2
Hispanic	213	2.6
Asian	29	0.4
American Indian	14	0.2

Table 8.14

Number and percent distributions of cases: Living arrangement

Living arrangement	Number	Percent
Total	8,786	100.0
Alone	2,729	31.1
Spouse only	3,038	34.6
Spouse/children	1,355	15.4
Family/relative	1,273	14.5
Non-relative	391	4.5

Table 8.15

Number and percent distributions of cases: Available caregiver

Caregiver	Number	Percent
Total	8,444	100.0
Self	2,323	26.5
Spouse only	2,391	27.3
Informal	3,330	38.0
Formal/paid	723	8.2

Table 8.16

Number and percent distributions of cases:
Housing

Housing	Number	Percent
Total	8,342	100.0
Detached house	5,802	69.6
Apartment	1,719	20.6
Mobile home	367	4.4
Townhouse	198	2.4
Personal care home	180	2.2
Rented room	76	0.9

Table 8.17

Number and percent distributions of cases:
Pets in residence

Pets	Number	Percent
Total	4,455	100.0
Yes	899	20.2
No	3,556	79.8

Table 8.18

Number and percent distributions of cases: Comprehension level

Comprehension	Number	Percent
Total	8,797	100.0
Able	6,442	73.2
Partially able	1,965	22.4
Unable	390	4.4

Table 8.19

Number and percent distributions of cases: communication level

Communication	Number	Percent
Total	8,796	100.0
Able	7,307	83.1
Partially able	1,219	13.9
Unable	270	3.1

Table 8.20

Number and percent distributions of mental status conditions: Cases

	Mental Status Conditions	
Mental status	Number	Percent
Total	8,840	–
Oriented	7,533	85.2
Comatose	50	0.6
Forgetful	2,647	29.9
Depressed	1,453	16.4
Disoriented	897	10.1
Lethargic	814	9.2
Agitated	519	5.9
Other	924	5.9

Table 8.21

Number and percent distributions of cases: Prognosis

Prognosis	Number	Percent
Total	8,747	52.5
Poor	577	6.6
Guarded	1,404	16.1
Fair	4,196	48.0
Good	2,494	28.5
Excellent	76	0.9

Table 8.22

Number and percent distributions of cases: Admission status

Admission status	Number	Percent
Total	8,720	100.0
New Admission	6,398	73.4
Re-admission	2,322	26.6

Table 8.23

Number and percent distributions of cases: Referral source

Referral source	Number	Percent
Total	8,765	100.0
Acute care hospital	6,408	73.1
Physician Office	1,247	14.2
Nursing home	190	2.2
Rehab Hospital	158	1.8
Family/friend	361	4.1
Self	92	1.0
Outpatient clinic	108	1.2
Other agency	201	2.3

Table 8.24

Number and percent distributions of cases: Discharge status

Status	Number	Percent
Total	8,713	100.0
Recovered	787	9.0
Improved	3,788	43.5
No Change	444	5.1
Stabilized	1,510	17.3
Deteriorated	1,143	13.1
Expired in Home	540	6.2
Expired in Hospital	501	5.8

Table 8.25

Number and percent distributions of cases: Discharge disposition

Disposition	Number	Percent
Total	8,741	100.0
Self/Family	5,696	65.2
Hospital	1,283	14.7
Nursing Home	309	3.5
Adult Home	102	1.2
Other Institution	32	0.4
Other Program	226	2.6
Other Agency	98	1.1
Other	995	11.4

Table 8.26

Number and percent distributions of cases: Reason for discharge

Discharge Reason	Number	Percent
Total	8,741	100.0
Service Not Needed	5,665	64.8
Moved	240	2.7
Refuse Treatment	129	1.5
Caregiver Available	30	0.3
Noncompliant	79	0.9
Unsafe for Staff	15	0.2
Other	2,583	29.6

Table 8.27

Number and percent distributions of cases:
Discharge goals accomplished

Goals	Number	Percent
Total	8,737	100.0
Goals Met	4,927	56.4
Partially Met	2,635	30.2
Goals Not Met	905	10.4
Not Applicable	270	3.1

Table 8.28

Number and percent distributions of cases:
Care motivation

Motivation	Number	Percent
Total	8,362	100.0
Motivated	5,047	60.4
Partially	2,062	24.7
Not Motivated	631	7.5
Not Applicable	622	7.4

Table 8.29

Frequency comparisons of levels of performance of cases: Functional activity (ADL) on admission and discharge

Bathing

	Admission		Discharge	
Level	Number	Percent	Number	Percent
Independent	2,003	23.0	3,508	41.6
Assistance	4,816	55.2	3,365	39.9
Dependent	1,905	21.8	1,565	18.5

Dressing

	Admission		Discharge	
Level	Number	Percent	Number	Percent
Independent	2,820	32.4	4,171	49.6
Assistance	4,269	49.1	2,804	33.3
Dependent	1,606	18.5	1,436	17.1

Toileting

	Admission		Discharge	
Level	Number	Percent	Number	Percent
Independent	3,996	45.8	4,823	57.0
Assistance	3,449	39.5	2,419	28.6
Dependent	1,277	14.6	1,214	14.4

Table 8.29 (cont.)

Frequency comparisons of levels of performance of cases: Functional activity (ADL) on admission and discharge

Transfer

	Admission		Discharge	
Level	Number	Percent	Number	Percent
Independent	3,546	40.7	4,720	55.7
Assistance	3,964	45.4	2,621	30.9
Dependent	1,213	13.9	1,130	13.3

Continence

	Admission		Discharge	
Level	Number	Percent	Number	Percent
Independent	5,841	67.2	6,004	71.2
Assistance	1,618	18.6	1,288	15.3
Dependent	1,229	14.1	1,136	13.5

Feeding

	Admission		Discharge	
Level	Number	Percent	Number	Percent
Independent	6,589	75.6	6,561	77.6
Assistance	1,429	16.4	1,054	12.5
Dependent	700	8.0	838	9.9

Table 8.29 (cont.)

Frequency comparisons of levels of performance of cases: Functional activity (ADL) on admission and discharge

Walking

	Admission		Discharge	
Level	Number	Percent	Number	Percent
Independent	2,011	23.0	3,268	38.6
Assistance	5,192	59.4	3,801	44.0
Dependent	1,536	17.6	1,403	16.6

Telephone

	Admission		Discharge	
Level	Number	Percent	Number	Percent
Independent	5,645	71.6	5,560	72.4
Assistance	1,016	12.9	825	10.7
Dependent	1,222	15.5	1,295	16.9

Medications

	Admission		Discharge	
Level	Number	Percent	Number	Percent
Independent	2,788	32.3	4,250	50.6
Assistance	3,919	45.4	2,518	30.0
Dependent	1,932	22.4	1,627	19.4

Table 8.30

Mean comparisons of five ADL scales of cases[1]: Admission and discharge:

Type	Admission		Discharge		Change
ADL scale	Number	Mean visits	Number	Mean visits	
GU ADL	6,701	14.59	6,574	13.40	-1.19
RUGS ADL	7,531	4.54	7,415	4.11	-0.43
Katz (6)	7,683	2.40	7,683	1.71	-0.69
Katz (7)	7,683	3.14	7,683	2.95	-0.19
IADL (2)	6,800	3.16	6,757	2.87	-0.29

1/ Episode less than one year

Table 8.31

Frequency comparisons of GU ADL scale scores of cases: Admission, discharge, and differences

GU ADL Score	Admission		Discharge	
	Number	Percent	Number	Percent
9	600	7.8	1059	14.3
10	673	8.7	1260	17.0
11	701	9.1	862	11.6
12	677	8.1	582	7.8
13	702	9.1	449	6.1
14	763	9.9	461	6.2
15	718	9.3	413	5.6
16	513	6.7	346	4.7
17	391	5.1	250	3.4
18	343	4.5	255	3.4
19	229	3.0	158	2.1
20	178	2.3	146	2.0
21	149	1.9	118	1.6
22	138	1.8	95	1.3
23	122	1.6	131	1.8
24	125	1.6	124	1.7
25	115	1.5	156	2.1
26	128	1.7	168	2.3
27	436	5.7	385	5.2

	Difference	
Percent	Number	Percent
-14	2	0.0
-13	1	0.0
-12	6	0.1
-11	7	0.1
-10	12	0.2
-9	29	0.4
-8	28	0.4
-7	72	1.0
-6	139	1.9
-5	330	4.5
-4	379	5.1
-3	498	6.7
-2	695	9.4
-1	787	10.7
0	3762	50.9
1	144	1.9
2	91	1.2
3	66	0.9
4	54	0.7
5	60	0.8
6	50	0.7
7	63	0.9
8	23	0.3
9	25	0.3
10	19	0.3
11	14	0.2
12	12	0.2
13	6	0.1
14	15	0.2

Table 8.32

Frequency distributions of the one hundred forty-seven nursing diagnoses: Multiple, unduplicated categories, and cases

Nursing diagnoses	RN DXs (multi)		RN DXs (undup.)		Cases 8840
	#	%	#	%	%
Total	40361	100.00	40361	100.00	
Family Coping, Impaired	168	0.42	168	0.42	1.90
Compromised	6	0.01	6	0.01	0.07
Disabled	6	0.01	6	0.01	0.07
Health Seeking Behavior	3	0.01	3	0.01	0.03
Individual Coping, Impaired	357	0.89	357	0.89	4.04
Adjustment, Impaired	11	0.03	11	0.03	0.12
Conflict: Decisional	1	0.00	1	0.00	0.01
Coping: Defensive	2	0.00	2	0.00	0.02
Denial, Impaired	4	0.01	4	0.01	0.05
Noncompliance	64	0.16	64	0.16	0.72
Care Management	34	0.08	34	0.08	0.38
Diet/Fluids	112	0.28	112	0.28	1.27
Medications	284	0.71	284	0.71	3.21
Medical Orders/Regimes	96	0.24	96	0.24	1.09
Safety Precautions	5	0.01	5	0.01	0.06
Treatments/Procedures/Interventions	35	0.09	35	0.09	0.40
Communication, Impaired	128	0.32	128	0.32	1.45
Verbal	53	0.13	53	0.13	0.60
Bowel Elimination, Altered	853	2.12	853	2.12	9.65
Bowel Incontinence	98	0.24	98	0.24	1.11
Constipation: Colonic	16	0.04	16	0.04	0.18
Constipation: Perceived	28	0.07	28	0.07	0.32
Diarrhea	134	0.33	134	0.33	1.52
Constipation: Unspecified	444	1.10	444	1.10	5.02
Fecal Impaction	57	0.14	57	0.14	0.64
Cardiac Output, Altered	1819	4.52	1819	4.52	20.58
Fluid Volume, Altered	370	0.92	370	0.92	4.19
Fluid Volume, Deficit	244	0.61	244	0.61	2.76
Fluid Volume, Deficit: Risk	53	0.13	53	0.13	0.60
Fluid Volume, Excess	492	1.22	492	1.22	5.57
Fluid Volume, Excess: Risk	16	0.04	16	0.04	0.18
Injury: Risk	775	1.93	775	1.93	8.77
Aspiration	3	0.01	3	0.01	0.03
Poisoning	1	0.00	1	0.00	0.01
Suffocation/ Choking	2	0.00	2	0.00	0.02
Trauma	31	0.08	31	0.08	0.35
Nutrition, Altered	969	2.41	969	2.41	10.96

Table 8.32 (cont.)

Frequency distributions of the one hundred forty-seven nursing diagnoses: Multiple, unduplicated categories, and cases

Nursing diagnoses	RN DXs (multi)		RN DXs (undup.)		Cases 8840
	#	%	#	%	%
Less than Body Requirement	609	1.51	609	1.51	6.89
More than Body Requirement	55	0.14	55	0.14	0.62
More than Body Requirements: Risk	8	0.02	8	0.02	0.09
Physical Regulation, Altered	157	0.39	157	0.39	1.78
Hyperthermia	32	0.08	32	0.08	0.36
Hypothermia	4	0.01	4	0.01	0.05
Thermoregulation, Impaired	9	0.02	9	0.02	0.10
Infection: Risk	588	1.46	588	1.46	6.65
Infection: Unspecified	32	0.08	32	0.08	0.36
Respiration, Altered	1451	3.61	1451	3.61	16.41
Airway Clearance, Impaired	97	0.24	97	0.24	1.10
Breathing Pattern, Impaired	317	0.79	317	0.79	3.59
Gas Exchange, Impaired	324	0.81	324	0.81	3.67
Tissue Integrity, Altered	1092	2.72	1092	2.72	12.35
Oral Mucous Membranes, Impaired	37	0.09	37	0.09	0.42
Skin Integrity, Impaired	1237	3.08	1237	3.08	13.99
Skin Integrity, Impaired: Risk	307	0.76	307	0.76	3.47
Skin Integrity: Invasive	808	2.01	808	2.01	9.14
Tissue Perfusion, Altered	195	0.48	195	0.48	2.21
Cardiopulmonary	572	1.42	572	1.42	6.47
Cerebral	788	1.96	788	1.96	8.91
Gastrointestinal	691	1.72	691	1.72	7.82
Peripheral	174	0.43	174	0.43	1.97
Renal	93	0.23	93	0.23	1.05
Endocrine	954	2.37	954	2.37	10.79
Immunological	54	0.13	54	0.13	0.61
Musculoskeletal	782	1.94	782	1.94	8.85
Other System Condition	1522	3.78	1522	3.78	17.22
Urinary Elimination, Altered	1235	3.07	1235	3.07	13.97
Incontinence: Functional	49	0.12	49	0.12	0.55
Incontinence: Reflex	4	0.01	4	0.01	0.05
Incontinence: Stress	11	0.03	11	0.03	0.12
Incontinence: Urge	2	0.00	2	0.00	0.02
Incontinence: Total	333	0.83	333	0.83	3.77
Retention	104	0.26	104	0.26	1.18
Anxiety	309	0.77	309	0.77	3.50
Comfort, Altered	1001	2.49	1001	2.49	11.32
Pain, Acute	76	0.19	76	0.19	0.86
Pain, Chronic	177	0.44	177	0.44	2.00

Table 8.32 (cont.)

Frequency distributions of the one hundred forty-seven nursing diagnoses: Multiple, unduplicated categories, and cases

Nursing diagnoses	RN DXs (multi)		RN DXs (undup.)		Cases 8840
	#	%	#	%	%
Pain, Unspecified	318	0.79	318	0.79	3.60
Fear	39	0.10	39	0.10	0.44
Grieving	32	0.08	32	0.08	0.36
Anticipatory	34	0.08	34	0.08	0.38
Dysfunctional	3	0.01	3	0.01	0.03
Post-Trauma Response	1	0.00	1	0.00	0.01
Violence: Risk	6	0.01	6	0.01	0.07
Dying Process	63	0.16	63	0.16	0.71
Knowledge Deficit	817	2.03	817	2.03	9.24
Care Management	597	1.48	597	1.48	6.75
Diagnostic/ Laboratory Tests	22	0.05	22	0.05	0.25
Diet/ Fluids	863	2.15	863	2.15	9.76
Disease Processes/S&S/General	1143	2.84	1143	2.84	12.93
Medications	2037	5.06	2037	5.06	23.04
Medical Orders/Regimes	512	1.27	512	1.27	5.79
Safety Precautions	252	0.63	252	0.63	2.85
Treatments/Procedures/Interventions	974	2.42	974	2.42	11.02
Thought Processes, Altered	838	2.08	838	2.08	9.48
Medication: Risk	459	1.14	459	1.14	5.19
Activity, Altered	469	1.17	469	1.17	5.31
Activity Intolerance	1181	2.94	1181	2.94	13.36
Activity Intolerance: Risk	11	0.03	11	0.03	0.12
Diversional Activity Deficit	18	0.04	18	0.04	0.20
Fatigue	59	0.15	59	0.15	0.67
Physical Mobility, Impaired	1972	4.90	1972	4.90	22.31
Sleep Pattern Disturbance	122	0.30	122	0.30	1.38
Bathing/Hygiene Deficit	89	0.22	89	0.22	1.01
Dressing/Grooming Deficit	19	0.05	19	0.05	0.21
Feeding Deficit	52	0.13	52	0.13	0.59
Swallowing, Impaired	90	0.22	90	0.22	1.02
Growth and Development, Altered	2	0.00	2	0.00	0.02
Health Maintenance, Altered	350	0.87	350	0.87	3.96
Home Maint Management, Impaired	335	0.83	335	0.83	3.79
Toileting Deficit	9	0.02	9	0.02	0.10
Self Care Deficit	1339	3.33	1339	3.33	15.15
ADLs: Total	503	1.25	503	1.25	5.69
IADLs: Total	25	0.06	25	0.06	0.28
Hopelessness	2	0.00	2	0.00	0.02
Powerlessness	10	0.02	10	0.02	0.11

Table 8.32 (cont.)

Frequency distributions of the one hundred forty-seven nursing diagnoses: Multiple, unduplicated categories, and cases

Nursing diagnoses	RN DXs (multi) #	RN DXs (multi) %	RN DXs (undup.) #	RN DXs (undup.) %	Cases 8840 %
Self Concept, Altered	50	0.12	50	0.12	0.57
Body Image Disturbance	38	0.09	38	0.09	0.43
Personal Identity Disturbance	3	0.01	3	0.01	0.03
Self-Esteem Disturbance:Chronic Low	9	0.02	9	0.02	0.10
Self-Esteem Disturbance:Situational	1	0.00	1	0.00	0.01
Sensory Perception, Altered	44	0.11	44	0.11	0.50
Auditory	59	0.15	59	0.15	0.67
Kinesthetic	1	0.00	1	0.00	0.01
Olfactory	2	0.00	2	0.00	0.02
Tactile	6	0.01	6	0.01	0.07
Visual	133	0.33	133	0.33	1.50
Unilateral Neglect	1	0.00	1	0.00	0.01
Family Processes, Altered	41	0.10	41	0.10	0.46
Role Performance, Altered	28	0.07	28	0.07	0.32
Parenting, Altered	2	0.00	2	0.00	0.02
Sexuality Patterns, Altered	4	0.01	4	0.01	0.05
Socialization, Altered	14	0.03	14	0.03	0.16
Social Interaction, Impaired	7	0.02	7	0.02	0.08
Social Isolation	28	0.07	28	0.07	0.32
Spiritual State, Altered	13	0.03	13	0.03	0.15
Spiritual Distress	5	0.01	5	0.01	0.06

Table 8.33

Frequency distributions of the forty-two nursing diagnoses major categories: Multiple, unduplicated categories, and cases

Nursing diagnoses major categories	RN DXs (multi)		RN DXs (undup.)		Cases 8840
	#	%	#	%	%
Total	40296	100.00	33145	100.00	
Family Coping, Impaired	180	0.45	180	0.54	2.04
Health Seeking Behavior	3	0.01	3	0.01	0.03
Individual Coping, Impaired	375	0.93	373	1.13	4.22
Noncompliance	630	1.57	496	1.50	5.61
Communication, Impaired	181	0.45	179	0.54	2.02
Bowel Elimination, Altered	1630	4.05	1557	4.71	17.61
Cardiac Output, Altered	1819	4.52	1819	5.50	20.58
Fluid Volume, Altered	1175	2.92	1101	3.33	12.45
Injury: Risk	812	2.02	802	2.42	9.07
Nutrition, Altered	1641	4.08	1606	4.86	18.17
Physical Regulation, Altered	822	2.04	807	2.44	9.13
Respiration, Altered	2189	5.44	1944	5.88	21.99
Tissue Integrity, Altered	3481	8.65	3151	9.53	35.64
Tissue Perfusion, Altered	5825	14.48	3917	11.84	44.31
Urinary Elimination, Altered	1738	4.32	1630	4.93	18.44
Anxiety	309	0.77	309	0.93	3.50
Comfort, Altered	1572	3.91	1521	4.60	17.21
Fear	39	0.10	39	0.12	0.44
Grieving	69	0.17	69	0.21	0.78
Post-Trauma Response	1	0.00	1	0.00	0.01
Violence: Risk	6	0.01	6	0.02	0.07
Dying Process	63	0.16	63	0.19	0.71
Knowledge Deficit	7217	17.94	3717	11.24	42.05
Thought Processes, Altered	838	2.08	838	2.53	9.48
Medication: Risk	459	1.14	459	1.39	5.19
Activity, Altered	3832	9.53	3228	9.76	36.52
Bathing/Hygiene Deficit	89	0.22	89	0.27	1.01
Dressing/Grooming Deficit	19	0.05	19	0.06	0.21
Feeding Deficit	142	0.35	133	0.40	1.50
Growth and Development, Altered	2	0.00	2	0.01	0.02
Health Maintenance, Altered	350	0.87	350	1.06	3.96
Home Maint Management, Impaired	335	0.83	335	1.01	3.79
Toileting Deficit	9	0.02	9	0.03	0.10
Self Care Deficit	1867	4.64	1846	5.58	20.88
Meaningfulness, Altered	12	0.03	12	0.04	0.14
Self Concept, Altered	101	0.25	97	0.29	1.10

Table 8.33 (cont.)

Frequency distributions of the forty-two nursing diagnoses major categories: Multiple, unduplicated categories, and cases

Nursing diagnoses major categories	RN DXs (multi)		RN DXs (undup.)		Cases 8840
	#	%	#	%	%
Sensory Perception, Altered	246	0.61	228	0.69	2.58
Family Processes, Altered	41	0.10	41	0.12	0.46
Role Performance, Altered	30	0.07	30	0.09	0.34
Sexuality Patterns, Altered	4	0.01	4	0.01	0.05
Socialization, Altered	49	0.12	46	0.14	0.52
Spiritual State, Altered	18	0.04	18	0.05	0.20

Table 8.34

Frequency distributions of the fifty one nursing diagnoses expanded major categories: Multiple, unduplicated categories, and cases

Nursing diagnoses expanded major categories	RN DXs (multi)		RN DXs (undup.)		Cases 8840
	#	%	#	%	%
Total	40361	100.00	35123	100.00	
Family Coping, Impaired	180	0.45	180	0.51	2.04
Health Seeking Behavior	3	0.01	3	0.01	0.03
Individual Coping, Impaired	375	0.93	373	1.07	4.22
Noncompliance	630	1.57	496	1.42	5.61
Communication, Impaired	181	0.45	179	0.51	2.02
Bowel Elimination, Altered	1630	4.05	1557	4.45	17.61
Cardiac Output, Altered	1819	4.52	1819	5.20	20.58
Fluid Volume, Altered	1175	2.92	1101	3.15	12.45
Injury: Risk	812	2.02	802	2.29	9.07
Nutrition, Altered	1641	4.08	1606	4.59	18.17
Physical Regulation, Altered	822	2.04	807	2.31	9.13
Respiration, Altered	2189	5.44	1944	5.56	21.99
Tissue Integrity, Altered	3481	8.65	3151	9.01	35.64
Tissue Perfusion, Altered	195	0.48	195	0.56	2.21
Cardiopulmonary	572	1.42	572	1.64	6.47
Cerebral	788	1.96	788	2.25	8.91
Gastrointestinal	691	1.72	691	1.98	7.82
Peripheral	174	0.43	174	0.50	1.97
Renal	93	0.23	93	0.27	1.05
Endocrine	954	2.37	954	2.73	10.79
Immunological	54	0.13	54	0.15	0.61
Musculoskeletal	782	1.94	782	2.24	8.85
Other System Condition	1522	3.78	1522	4.35	17.22
Urinary Elimination, Altered	1738	4.32	1630	4.66	18.44
Anxiety	309	0.77	309	0.88	3.50
Comfort, Altered	1572	3.91	1521	4.35	17.21
Fear	39	0.10	39	0.11	0.44
Grieving	69	0.17	69	0.20	0.78
Post-Trauma Response	1	0.00	1	0.00	0.01
Violence: Risk	6	0.01	6	0.02	0.07
Dying Process	63	0.16	63	0.18	0.71
Knowledge Deficit	7217	17.94	3717	10.63	42.05
Thought Processes, Altered	838	2.08	838	2.40	9.48
Medication: Risk	459	1.14	459	1.31	5.19
Activity, Altered	3832	9.53	3228	9.23	36.52
Bathing/Hygiene Deficit	89	0.22	89	0.25	1.01

Table 8.34 (cont.)

Frequency distributions of the fifty one nursing diagnoses expanded major categories: Multiple, unduplicated categories, and cases

Nursing diagnoses expanded major categories	RN DXs (multi)		RN DXs (undup.)		Cases 8840
	#	%	#	%	%
Dressing/Grooming Deficit	19	0.05	19	0.05	0.21
Feeding Deficit	142	0.35	133	0.38	1.50
Growth and Development, Altered	2	0.00	2	0.01	0.02
Health Maint., Altered	350	0.87	350	1.00	3.96
Home Maint. Managt., Impaired	335	0.83	335	0.96	3.79
Toileting Deficit	9	0.02	9	0.03	0.10
Self Care Deficit	1867	4.64	1846	5.28	20.88
Meaningfulness, Altered	12	0.03	12	0.03	0.14
Self Concept, Altered	101	0.25	97	0.28	1.10
Sensory Perception, Altered	246	0.61	228	0.65	2.58
Family Processes, Altered	41	0.10	41	0.12	0.46
Role Performance, Altered	30	0.07	30	0.09	0.34
Sexuality Patterns, Altered	4	0.01	4	0.01	0.05
Socialization, Altered	49	0.12	46	0.13	0.52
Spiritual State, Altered	18	0.04	18	0.05	0.20

Table 8.35

Frequency distributions of range of one hundred forty-seven nursing diagnoses: Cases

Range	Number	Percent
1	927	10.5
2	1322	15
3	1518	17.2
4	1411	16
5	1025	11.6
6	821	9.3
7	569	6.4
8	394	4.5
9	267	3
10	186	2.1
11	135	1.5
12	80	0.9
13	64	0.7
14	42	0.5
15	34	0.4
16	18	0.2
17	12	0.1
18	9	0.1
19	6	0.1

Table 8.36

Frequency distributions of range of forty-two nursing diagnoses major categories: Cases

Range	Number	Percent
1	1171	13.2
2	1812	20.5
3	1737	19.6
4	1423	16.1
5	1001	11.3
6	685	7.7
7	415	4.7
8	252	2.9
9	168	1.9
10	82	0.9
11	39	0.4
12	21	0.2
13	17	0.2
14	11	0.1
15	4	0
16	1	0
17	1	0

Table 8.37

Frequency distributions of range of fifty one nursing diagnoses expanded major categories: Cases

Range	Number	Percent
1	1079	12.2
2	1613	18.2
3	1716	19.4
4	1465	16.6
5	1010	11.4
6	749	8.5
7	453	5.1
8	274	3.1
9	218	2.5
10	123	1.4
11	55	0.6
12	37	0.4
13	24	0.3
14	14	0.2
15	7	0.1
16	2	0
17	1	0

Table 8.38

Frequency distributions of the nine human response patterns:
Multiple, unduplicated categories, and cases

Human response patterns	RN DXs (multi)		RN DXs (undup.)		Cases 8840
	#	%	#	%	%
Total	40223	100.00	20245	100.00	
Choosing	1172	2.91	945	4.67	10.69
Communicating	179	0.45	177	0.88	2.00
Exchanging	21078	52.41	7848	38.80	88.78
Feeling	2047	5.09	1802	8.91	20.38
Knowing	8503	21.14	4381	21.66	49.56
Moving	6627	16.48	4524	22.37	51.18
Perceiving	345	0.86	317	1.57	3.59
Relating	117	0.29	113	0.56	1.28
Value	16	0.04	16	0.08	0.18

Table 8.39

Frequency distributions of range of nine human response patterns: Cases

Range	Number	Percent
1	2266	25.6
2	3150	35.6
3	2252	25.5
4	887	10
5	225	2.5
6	50	0.6
7	9	0.1
8	1	0

Table 8.40

Frequency distributions of the eleven nursing diagnoses functional health patterns: Multiple, unduplicated categories, and cases

Functional health patterns	RN DXs (multi)		RN DXs (undup.)		Cases 8840
	#	%	#	%	%
Total	40361	100.00	23170	100.00	
Health Perception/Health Management	2256	5.61	1875	8.14	21.21
Nutritional-Metabolic	7209	17.92	4781	20.76	54.08
Elimination	3368	8.37	2671	11.60	30.21
Activity-Exercise	15855	39.42	7199	31.26	81.44
Cognitive-Perceptual	122	0.30	122	0.53	1.38
Sleep-Rest	9873	24.55	4987	21.66	56.41
Self-Perception/Selp-Concept	520	1.29	470	2.04	5.32
Role-Relationship	433	1.08	402	1.75	4.55
Sexuality-Reproductive	4	0.01	4	0.02	0.05
Coping-Stress Tollerance	562	1.40	500	2.17	5.66
Value-Belief	18	0.04	18	0.08	0.20

Table 8.41

Frequency distributions of range of eleven nursing diagnoses functional health patterns: Cases

Range	Number	Percent
1	1768	20
2	2745	31.1
3	2329	26.3
4	1287	14.6
5	541	6.1
6	130	1.5
7	30	0.3
8	8	0.1
9	2	0

Table 8.42

Frequency distributions of the twenty nursing diagnoses home health care components: Multiple, unduplicated categories, and cases

Home health care components	RN DXs (multi)		RN DXs (undup.)		Cases 8840
	#	%	#	%	%
Total	40361	100.00	33307	100.00	
Activity	4614	11.47	3742	11.28	42.33
Cardiac Output	2391	5.94	2329	7.02	26.35
Cognitive	8843	21.99	4605	13.88	52.09
Coping	637	1.58	556	1.68	6.29
Digestive	2321	5.77	2069	6.24	23.40
Fluid	1175	2.92	1101	3.32	12.45
Health Behavior	1320	3.28	1063	3.21	12.02
Injury/Safety	812	2.02	802	2.42	9.07
Medication	459	1.14	459	1.38	5.19
Metabolic	1008	2.51	996	3.00	11.27
Nutritional	1641	4.08	1606	4.84	18.17
Physical Regulation	822	2.04	807	2.43	9.13
Respiratory	2189	5.44	1944	5.86	21.99
Role Relationship	380	0.94	358	1.08	4.05
Self-Concept	461	1.15	419	1.26	4.74
Self-Care	2126	5.29	1991	6.00	22.52
Sensory	1818	4.52	1689	5.09	19.11
Tissue Perfusion	1717	4.27	1692	5.10	19.14
Tissue/Skin Integrity	3655	9.09	3238	9.76	36.63
Urinary	1831	4.55	1700	5.13	19.23

Table 8.43

Frequency distributions of range of twenty nursing diagnoses home health care components: Cases

Range	Number	Percent
1	1118	12.6
2	1697	19.2
3	1800	20.4
4	1515	17.1
5	1032	11.7
6	689	7.8
7	426	4.8
8	265	3
9	160	1.8
10	68	0.8
11	37	0.4
12	19	0.2
13	12	0.1
14	2	0

Table 8.44

Frequency distributions of the one hundred sixty-six nursing intervention major categories: Multiple, unduplicated categories, and cases

Nursing intervention major categories	RN RXs (multi)		RN RXs (undup.)		Cases 8840
	#	%	#	%	%
Total[1/]	73529	100.00	73529	100.00	
Abuse Control	34	0.05	34	0.05	0.38
Activity Care	766	1.04	766	1.04	8.67
Cardiac Rehabilitation	129	0.18	129	0.18	1.46
Energy Conservation	676	0.92	676	0.92	7.65
Allergic Reaction Care	6	0.01	6	0.01	0.07
Bladder Care	359	0.49	359	0.49	4.06
Bladder Training	80	0.11	80	0.11	0.90
Bladder Instillation	163	0.22	163	0.22	1.84
Body System Condition Care	1698	2.31	1698	2.31	19.21
Cardiopulmonary	3194	4.35	3194	4.35	36.13
Cardiovascular	1355	1.84	1355	1.84	15.33
Endocrine	255	0.35	255	0.35	2.88
Gastrointestinal	838	1.14	838	1.14	9.48
Genitourinary	908	1.24	908	1.24	10.27
Integumentary	971	1.32	971	1.32	10.98
Musculoskeletal	379	0.52	379	0.52	4.29
Neurological	676	0.92	676	0.92	7.65
Psychological	419	0.57	419	0.57	4.74
Other Condition	245	0.33	245	0.33	2.77
Bowel Care	1056	1.44	1056	1.44	11.95
Bowel Training	923	1.26	923	1.26	10.44
Enema	652	0.89	652	0.89	7.38
Disimpaction	117	0.16	117	0.16	1.32
Catheter Care	706	0.96	706	0.96	7.99
Catheter Insertion	894	1.22	894	1.22	10.11
Catheter Irrigation	76	0.10	76	0.10	0.86
Chemotherapy Care	66	0.09	66	0.09	0.75
Communication Care	39	0.05	39	0.05	0.44
Community Services	164	0.22	164	0.22	1.86
Adult Day Care	6	0.01	6	0.01	0.07
Hospice Care	70	0.10	70	0.10	0.79
Meals on Wheels	72	0.10	72	0.10	0.81
Other Service	309	0.42	309	0.42	3.50
Compliance Analysis	429	0.58	429	0.58	4.85
Diet/Fluids	249	0.34	249	0.34	2.82
Medical Regime	220	0.30	220	0.30	2.49
Medications	809	1.10	809	1.10	9.15

Table 8.44 (cont.)

Frequency distributions of the one hundred sixty-six nursing intervention major categories: Multiple, unduplicated categories, and cases

Nursing intervention major categories	RN RXs (multi)		RN RXs (undup.)		Cases 8840
	#	%	#	%	%
Safety	17	0.02	17	0.02	0.19
Treatment Modality	422	0.57	422	0.57	4.77
Counseling Services	33	0.04	33	0.04	0.37
Coping	187	0.25	187	0.25	2.12
Stress Control	124	0.17	124	0.17	1.40
Decubitus Care	320	0.44	320	0.44	3.62
Stage 1	472	0.64	472	0.64	5.34
Stage 2	8	0.01	8	0.01	0.09
Stage 3	396	0.54	396	0.54	4.48
Stage 4	2	0.00	2	0.00	0.02
Diabetic Care	1361	1.85	1361	1.85	15.40
Finger Stick	490	0.67	490	0.67	5.54
Insulin Administration	362	0.49	362	0.49	4.10
Prefill Insulin	35	0.05	35	0.05	0.40
Reaction Control	300	0.41	300	0.41	3.39
Dialysis Care	10	0.01	10	0.01	0.11
Ear Care	9	0.01	9	0.01	0.10
Hearing Aid Control	2	0.00	2	0.00	0.02
Wax Removal	3	0.00	3	0.00	0.03
Edema Control	1011	1.38	1011	1.38	11.44
Emergency Care	507	0.69	507	0.69	5.74
Emotional Support	360	0.49	360	0.49	4.07
Spiritual Comfort	5	0.01	5	0.01	0.06
Eye Care	22	0.03	22	0.03	0.25
Cataract Care	44	0.06	44	0.06	0.50
Fluid Therapy	654	0.89	654	0.89	7.40
Hydration Status	1131	1.54	1131	1.54	12.79
Intake/Output	329	0.45	329	0.45	3.72
Foot Care	190	0.26	190	0.26	2.15
Fracture Care	37	0.05	37	0.05	0.42
Cast Care	19	0.03	19	0.03	0.21
Immobilizer	40	0.05	40	0.05	0.45
Gastrostomy/NG Tube Care	67	0.09	67	0.09	0.76
Tube Insertion	75	0.10	75	0.10	0.85
Tube Irrigation	11	0.01	11	0.01	0.12
Infection Control	1194	1.62	1194	1.62	13.51
Universal Precautions	2	0.00	2	0.00	0.02
Infusion Care	103	0.14	103	0.14	1.17
Intravenous	191	0.26	191	0.26	2.16

Table 8.44 (cont.)

Frequency distributions of the one hundred sixty-six nursing intervention major categories: Multiple, unduplicated categories, and cases

Nursing intervention major categories	RN RXs (multi)		RN RXs (undup.)		Cases 8840
	#	%	#	%	%
Venous Catheter Care	47	0.06	47	0.06	0.53
Injection Administration	435	0.59	435	0.59	4.92
Vitamin B12	125	0.17	125	0.17	1.41
Medication Administration	4097	5.58	4097	5.58	46.35
Actions	1553	2.11	1553	2.11	17.57
Prefill Preparation	88	0.12	88	0.12	1.00
Side Effects	1300	1.77	1300	1.77	14.71
Mental Health Care	79	0.11	79	0.11	0.89
MH History	1	0.00	1	0.00	0.01
MH Promotion	4	0.01	4	0.01	0.05
MH Screening	47	0.06	47	0.06	0.53
MH Treatment Modality	95	0.13	95	0.13	1.07
Violence Control	7	0.01	7	0.01	0.08
Mobility Therapy	304	0.41	304	0.41	3.44
Ambulation	423	0.58	423	0.58	4.79
Assistive Device	240	0.33	240	0.33	2.71
Transfer	291	0.40	291	0.40	3.29
Mouth Care	68	0.09	68	0.09	0.77
Nursing Contact	144	0.20	144	0.20	1.63
Bill of Rights	2	0.00	2	0.00	0.02
Care Coordination	52	0.07	52	0.07	0.59
RN Status Report	111	0.15	111	0.15	1.26
Nutrition Care	2716	3.70	2716	3.70	30.72
Enteral/Parenteral Feeding	221	0.30	221	0.30	2.50
Feeding Technique	119	0.16	119	0.16	1.35
Regular Diet	19	0.03	19	0.03	0.21
Special Diet	1457	1.98	1457	1.98	16.48
Ostomy Care	333	0.45	333	0.45	3.77
Irrigation	17	0.02	17	0.02	0.19
Oxygen Therapy Care	460	0.63	460	0.63	5.20
Pacemaker Care	37	0.05	37	0.05	0.42
Pain Control	1358	1.85	1358	1.85	15.36
Comfort Care	140	0.19	140	0.19	1.58
Perineal Care	66	0.09	66	0.09	0.75
Personal Care	666	0.91	666	0.91	7.53
ADLs	19	0.03	19	0.03	0.21
Bedbound Care	508	0.69	508	0.69	5.75
IADLs	17	0.02	17	0.02	0.19
Physical Health Care	201	0.27	201	0.27	2.27

Table 8.44 (cont.)

Frequency distributions of the one hundred sixty-six nursing intervention major categories: Multiple, unduplicated categories, and cases

Nursing intervention major categories	RN RXs (multi) #	RN RXs (multi) %	RN RXs (undup.) #	RN RXs (undup.) %	Cases 8840 %
Examination	1055	1.44	1055	1.44	11.93
Health Promotion	9	0.01	9	0.01	0.10
History	4	0.01	4	0.01	0.05
Measurements	77	0.10	77	0.10	0.87
Specimen Analysis	329	0.45	329	0.45	3.72
Physician Contact	91	0.12	91	0.12	1.03
Medical Regime	244	0.33	244	0.33	2.76
MD Status Report	1661	2.26	1661	2.26	18.79
Professional/Ancillary Service	43	0.06	43	0.06	0.49
Home Health Aide	727	0.99	727	0.99	8.22
Medical Social Worker	629	0.86	629	0.86	7.12
Nurse Specialist	28	0.04	28	0.04	0.32
Occupational Therapist	102	0.14	102	0.14	1.15
Physical Therapist	404	0.55	404	0.55	4.57
Speech Therapist	35	0.05	35	0.05	0.40
Other Caregiver	292	0.40	292	0.40	3.30
Other Professional	154	0.21	154	0.21	1.74
Psychosocial Analysis	39	0.05	39	0.05	0.44
Home Situation	247	0.34	247	0.34	2.79
Interpersonal Dynamics	97	0.13	97	0.13	1.10
Radiation Therapy Care	42	0.06	42	0.06	0.48
Respiratory Care	316	0.43	316	0.43	3.57
Breathing Exercises	289	0.39	289	0.39	3.27
Chest Physiotherapy	219	0.30	219	0.30	2.48
Inhalation Therapy	315	0.43	315	0.43	3.56
Restorative Care	2703	3.68	2703	3.68	30.58
Exercises	407	0.55	407	0.55	4.60
Safety Precautions	1620	2.20	1620	2.20	18.33
Environmental Hazard	149	0.20	149	0.20	1.69
Equipment Care	316	0.43	316	0.43	3.57
Sleep Pattern Control	15	0.02	15	0.02	0.17
Skin Care	943	1.28	943	1.28	10.67
Skin Breakdown Control	21	0.03	21	0.03	0.24
Specimen Collection	29	0.04	29	0.04	0.33
Blood	2055	2.80	2055	2.80	23.25
Stool	16	0.02	16	0.02	0.18
Urine	212	0.29	212	0.29	2.40
Other Specimen	39	0.05	39	0.05	0.44
Symptom Control	1307	1.78	1307	1.78	14.79

Table 8.44 (cont.)

Frequency distributions of the one hundred sixty-six nursing intervention major categories: Multiple, unduplicated categories, and cases

Nursing intervention major categories	RN RXs (multi)		RN RXs (undup.)		Cases 8840
	#	%	#	%	%
Terminal Care	136	0.19	136	0.19	1.54
Dying/Death Measures	47	0.06	47	0.06	0.53
Funeral Arrangements	12	0.02	12	0.02	0.14
Tracheostomy Care	76	0.10	76	0.10	0.86
Vital Signs	2254	3.07	2254	3.07	25.50
Weight Control	631	0.86	631	0.86	7.14
Wound Care	1802	2.45	1802	2.45	20.38
Drainage Tube Care	63	0.09	63	0.09	0.71
Dressing Change	1695	2.31	1695	2.31	19.17
Incision Care	174	0.24	174	0.24	1.97
[1] Includes unknown variables:	898	1.22	898	1.22	10.16

Table 8.45

Frequency distributions of the fifty-six nursing intervention major categories: Multiple, unduplicated categories, and cases

Nursing interventions	RN RXs (multi)		RN RXs (undup.)		Cases 8840
	#	%	#	%	%
Total[1/]	73509	100.00	58332	100.00	
Abuse Control	34	0.05	34	0.06	0.38
Activity Care	1571	2.14	1394	2.39	15.77
Allergic Reaction Care	6	0.01	6	0.01	0.07
Bladder Care	602	0.82	579	0.99	6.55
Body System Condition Care	10938	14.88	5215	8.94	58.99
Bowel Care	2748	3.74	2081	3.57	23.54
Catheter Care	1676	2.28	1083	1.86	12.25
Chemotherapy Care	66	0.09	66	0.11	0.75
Communication Care	39	0.05	39	0.07	0.44
Community Services	621	0.85	577	0.99	6.53
Compliance Analysis	2146	2.92	1674	2.87	18.94
Counseling Services	344	0.47	318	0.55	3.60
Decubitus Care	1198	1.63	900	1.54	10.18
Diabetic Care	2548	3.47	1556	2.67	17.60
Dialysis Care	10	0.01	10	0.02	0.11
Ear Care	14	0.02	13	0.02	0.15
Edema Control	1011	1.38	1011	1.73	11.44
Emergency Care	507	0.69	507	0.87	5.74
Emotional Support	365	0.50	363	0.62	4.11
Eye Care	66	0.09	60	0.10	0.68
Fluid Therapy	2114	2.88	1881	3.23	21.28
Foot Care	190	0.26	190	0.33	2.15
Fracture Care	96	0.13	93	0.16	1.05
Gastrostomy/NG Tube Care	153	0.21	126	0.22	1.43
Infection Control	1196	1.63	1194	2.05	13.51
Infusion Care	341	0.46	263	0.45	2.98
Injection Administration	560	0.76	535	0.92	6.05
Medication Administration	7038	9.58	4965	8.51	56.17
Mental Health Care	233	0.32	212	0.36	2.40
Mobility Therapy	1258	1.71	1049	1.80	11.87
Mouth Care	68	0.09	68	0.12	0.77
Nursing Contact	309	0.42	304	0.52	3.44
Nutrition Care	4532	6.17	4055	6.95	45.87
Ostomy Care	350	0.48	334	0.57	3.78
Oxygen Therapy Care	460	0.63	460	0.79	5.20
Pacemaker Care	37	0.05	37	0.06	0.42
Pain Control	1498	2.04	1444	2.48	16.33

Table 8.45 (cont.)

Frequency distributions of the fifty-six nursing intervention major categories:
Multiple, unduplicated categories, and cases

Nursing Interventions	RN RXs (multi)		RN RXs (undup.)		Cases 8840
	#	%	#	%	%
Perineal Care	66	0.09	66	0.11	0.75
Personal Care	1210	1.65	1147	1.97	12.98
Physical Health Care	1675	2.28	1465	2.51	16.57
Physician Contact	1996	2.72	1854	3.18	20.97
Professional/Ancillary Service	2414	3.28	1753	3.01	19.83
Psychosocial Analysis	383	0.52	358	0.61	4.05
Radiation Therapy Care	42	0.06	42	0.07	0.48
Respiratory Care	1139	1.55	904	1.55	10.23
Restorative Care	3110	4.23	2887	4.95	32.66
Safety Precautions	2085	2.84	1939	3.33	21.93
Sleep Pattern Control	15	0.02	15	0.03	0.17
Skin Care	964	1.31	954	1.64	10.79
Specimen Collection	2351	3.20	2196	3.77	24.84
Symptom Control	1307	1.78	1307	2.24	14.79
Terminal Care	195	0.27	179	0.31	2.02
Tracheostomy Care	76	0.10	76	0.13	0.86
Vital Signs	2254	3.07	2254	3.87	25.50
Weight Control	631	0.86	631	1.08	7.14
Wound Care	3734	5.08	2690	4.61	30.43
1/ Includes unknown variables:	898	1.22	898	1.56	10.16

Table 8.46

Frequency distributions of range of one hundred sixty-six nursing intervention major categories: Cases

Range	Number	Percent
1	350	4
2	661	7.5
3	770	8.7
4	733	8.3
5	695	7.9
6	703	8
7	671	7.6
8	582	6.6
9	573	6.5
10	490	5.5
11	480	5.4
12	372	4.2
13	320	3.6
14	275	3.1
15	216	2.4
16	215	2.4
17	157	1.8
18	122	1.4
19	90	1
20	74	0.8
21	56	0.6
22	63	0.7
23	46	0.5
24	29	0.3
25	31	0.4
26	11	0.1
27	6	0.1
28	18	0.2
29	5	0.1
30	8	0.1
31	5	0.1
32	6	0.1
33	4	0
34	1	0
40	1	0
42	1	0

Table 8.47

Frequency distributions of range of fifty-six nursing intervention major categories: Cases

Range	Number	Percent
1	412	4.7
2	789	8.9
3	949	10.7
4	936	10.6
5	878	9.9
6	870	9.8
7	782	8.8
8	733	8.3
9	594	6.7
10	497	5.6
11	375	4.2
12	300	3.4
13	211	2.4
14	175	2
15	124	1.4
16	88	1
17	51	0.6
18	36	0.4
19	20	0.2
20	9	0.1
21	4	0
22	3	0
23	2	0
25	2	0

Table 8.48

Frequency distributions of the twenty-two nursing intervention home health care components: Multiple, unduplicated categories, and cases

Nursing intervention components	RN RXs (multi)		RN RXs (undup.)		Cases 8840
	#	%	#	%	%
Total	73529	100.00	53766	100.00	
Activity	3319	4.57	2392	4.52	27.06
Cardiac Output	4586	6.31	3738	7.07	42.29
Cognitive	676	0.93	676	1.28	7.65
Coping	904	1.24	736	1.39	8.33
Digestive	3936	5.42	2826	5.35	31.97
Fluid	2455	3.38	2062	3.90	23.33
Health Behavior	7486	10.31	4179	7.90	47.27
Injury/Safety	2119	2.92	1960	3.71	22.17
Medication	7706	10.61	5255	9.94	59.45
Metabolic	2809	3.87	1669	3.16	18.88
Nutritional	4685	6.45	4064	7.69	45.97
Physical Regulation	8614	11.86	5126	9.70	57.99
Respiratory	1675	2.31	1200	2.27	13.57
Role Relationship	422	0.58	387	0.73	4.38
Self-Concept	652	0.90	579	1.10	6.55
Self-Care	1210	1.67	1147	2.17	12.98
Sensory	1578	2.17	1506	2.85	17.04
Tissue Perfusion	3506	4.83	2855	5.40	32.30
Tissue/Skin Integrity	4212	5.80	2897	5.48	32.77
Urinary	3196	4.40	1996	3.78	22.58
Wound Care	3734	5.14	2690	5.09	30.43
Skilled Observation	3151	4.34	2928	5.54	33.12

Table 8.49

Frequency distributions of range of twenty-two nursing intervention home health care components: Cases

Range	Number	Percent
1	441	5
2	842	9.5
3	1005	11.4
4	963	10.9
5	1014	11.5
6	924	10.5
7	881	10
8	727	8.2
9	604	6.8
10	468	5.3
11	349	3.9
12	241	2.7
13	172	1.9
14	114	1.3
15	49	0.6
16	26	0.3
17	14	0.2
18	5	0.1
19	1	0

Table 8.50

Frequency distributions of the top fifty medical diagnoses or surgical procedures of cases: Rank order

Rank	#	%	ICD-9 code	Medical dianoses/ surgical procedures
1	490	5.64	428.0	Congestive heart failure
2	328	3.78	436	CVA
3	189	2.18	496	Chr obstr pulmonary
4	127	1.46	486	Pneumonia, organism
5	125	1.44	401.9	Hypertension
6	121	1.39	*15.9	Oth extraoc mus-tend
7	115	1.32	*14.1	Posterior seg diagnos
8	110	1.27	707.0	Decubitus ulcer
9	108	1.24	250.00	Diabetes uncompl non insul dep
10	107	1.23	410.9	Myocardial infarct
11	97	1.12	*61.0	Scrotum & tunica I & d
12	80	0.92	788.3	Incontinence of urine
13	74	0.85	599.0	Urin tract infection
14	72	0.83	162.9	Mal neo bronch/lung
15	69	0.79	*12.2	Anterior segment dx
16	68	0.78	250.90	Diab w compl adult
17	65	0.75	*61.3	Scrotal les destruction
18	65	0.75	*93.5	Oth immobiliz/wound
19	60	0.69	*92.9	Radio therapy
20	56	0.64	*16.9	Other eye & orbit
21	56	0.64	250.01	Diabetes uncompl insul dep
22	56	0.64	707.1	Chronic ulcer of leg
23	54	0.62	428	Heart failure
24	51	0.59	*57.9	Other bladder
25	50	0.58	*41.5	Total splenectomy
26	50	0.58	276.5	Dehydration/hypovolemia
27	49	0.56	*02	Other brain
28	49	0.56	*41.1	Puncture of spleen
29	49	0.56	*61.4	Scrotum & tunica repair
30	47	0.54	*89.3	Other examinations
31	44	0.51	788.2	Retention of urine
32	40	0.46	411.1	Unstable angina
33	40	0.46	427.31	Atrial fibrillation
34	39	0.45	*49.1	Incis/excis anal fistula
35	38	0.44	*62.2	Testicular les destruct
36	38	0.44	250.91	Diab w compl juven
37	36	0.41	427.9	Cardiac dysrhythmia
38	36	0.41	682.6	Cellulitis of leg
39	35	0.4	185	Malign neopl prostate
40	35	0.4	560.39	Impaction intestine

Table 8.50 (cont.)

Frequency distributions of the top fifty medical diagnoses or surgical procedures of cases: Rank order:

Rank	#	%	ICD-9 code	Medical dianoses/ surgical procedures
41	34	0.39	250.0	Diabetes mellitus uncomp
42	34	0.39	435.9	Trans cereb ischemia
43	33	0.38	780.3	Convulsions
44	32	0.37	*54.3	Destruct abd wall lesion
45	31	0.36	*12.4	Destr iris/cil body les
46	31	0.36	281.0	Pernicious anemia
47	30	0.35	*60.4	Retropubic prostatectomy
48	30	0.35	413.9	Angina pectoris
49	30	0.35	466.0	Acute bronchitis
50	30	0.35	578.9	Gastrointest hemorr

* Surgical procedure/operation

Table 8.51

Frequency distributions of the top fifty medical diagnoses or surgical procedures of cases: ICD-9 codes:

Rank	#	%	ICD-9 code	Medical dianoses/ surgical procedures
1	49	0.56	*02	Other brain
2	69	0.79	*12.2	Anterior segment dx
3	31	0.36	*12.4	Destr iris/cil body les
4	115	1.32	*14.1	Posterior seg diagnos
5	121	1.39	*15.9	Oth extraoc mus-tend
6	56	0.64	*16.9	Other eye & orbit
7	49	0.56	*41.1	Puncture of spleen
8	50	0.58	*41.5	Total splenectomy
9	39	0.45	*49.1	incis/excis anal fistula
10	32	0.37	*54.3	Destruct abd wall lesion
11	51	0.59	*57.9	Other bladder operations
12	30	0.35	*60.4	Retropubic prostatectomy
13	97	1.12	*61.0	Scrotum & tunica I & d
14	65	0.75	*61.3	Scrotal les destruction
15	49	0.56	*61.4	Scrotum & tunica repair
16	38	0.44	*62.2	Testicular les destruct
17	47	0.54	*89.3	Other examinations
18	60	0.69	*92.9	Radio therapy
19	65	0.75	*93.5	Oth immobiliz/wound
20	72	0.83	162.9	Mal neo bronch/lung
21	35	0.4	185	Malign neopl prostate
22	34	0.39	250.0	Diabetes mellitus uncomp
23	108	1.24	250.00	Diabetes uncompl non insul dep
24	56	0.64	250.01	Diabetes uncompl insul dep
25	68	0.78	250.90	Diab w compl adult
26	38	0.44	250.91	Diab w compl juven
27	50	0.58	276.5	Dehydration/hypovolemia
28	31	0.36	281.0	Pernicious anemia
29	125	1.44	401.9	Hypertension
30	107	1.23	410.9	Myocardial infarct
31	40	0.46	411.1	Unstable angina
32	30	0.35	413.9	Angina pectoris
33	40	0.46	427.31	Atrial fibrillation
34	36	0.41	427.9	Cardiac dysrhythmia
35	54	0.62	428	Heart failure
36	490	5.64	428.0	Congestive heart failure
37	34	0.39	435.9	Trans cereb ischemia
38	328	3.78	436	CVA
39	30	0.35	466.0	Acute bronchitis
40	127	1.46	486	Pneumonia, organism
41	189	2.18	496	Chr obstr pulmonary dis

Table 8.51 (cont.)

Frequency distributions of the top fifty medical diagnoses or surgical procedures of cases: ICD-9 codes:

Rank	#	%	ICD-9 code	Medical dianoses/ surgical procedures
42	35	0.4	560.39	Impaction intestine
43	30	0.35	578.9	Gastrointest hemorr
44	74	0.85	599.0	Urin tract infection
45	36	0.41	682.6	Cellulitis of leg
46	110	1.27	707.0	Decubitus ulcer
47	56	0.64	707.1	Chronic ulcer of leg
48	33	0.38	780.3	Convulsions
49	44	0.51	788.2	Retention of urine
50	80	0.92	788.3	Incontinence of urine

* Surgical procedure/operation

Table 8.52

Frequency distributions of home visits per case: Skilled nurses

Visit	Number	Percent	Cum. Freq.	Cum. Percent
1	277	3.2	277	3.2
2	502	5.8	779	9.0
3	656	7.5	1435	16.5
4	714	8.2	2149	24.7
5	683	7.9	2832	32.6
6	689	7.9	3521	40.5
7	615	7.1	4136	47.6
8	536	6.2	4672	53.7
9	447	5.1	5119	58.9
10-14	1217	17.3	6636	76.3
15-19	772	8.8	7408	85.2
20-24	423	4.9	7831	90.1
25-29	265	3.1	8096	93.1
30-34	163	1.8	8259	95.0
35-39	115	1.4	8374	96.3
40-49	136	1.5	8510	97.9
50-59	66	0.7	8576	98.6
60-69	32	0.2	8608	99.9
70 to 179	83	0.2	8691	100.0

Table 8.53

Frequency distributions of home visits per case: Home health aides

Visit	Number	Percent	Cum. Freq.	Cum. Percent
0	5333	61.3	5333	61.3
1	193	2.2	5526	63.5
2	190	2.2	5716	65.7
3	208	2.4	5924	68.1
4	200	2.3	6124	70.4
5	198	2.3	6322	72.7
6	196	2.3	6518	75.0
7	177	2.0	6695	77.0
8	159	1.8	6854	78.8
9	133	1.5	6987	80.3
10-14	557	6.3	7544	86.8
15-19	350	4.0	7894	90.8
20-24	240	2.9	8134	93.5
25-29	150	1.6	8284	95.3
30-34	97	1.1	8381	96.4
35-39	59	0.5	8440	97.1
40-44	38	0.4	8478	97.5
45-49	43	0.5	8521	98.0
50-59	61	0.7	8582	98.7
60-69	26	0.1	8608	99.0
70-159	83	0.3	8691	100.0

Table 8.54

Frequency distributions of home visits per case: Physical therapists

Visit	Number	Percent	Cum. Freq.	Cum. Percent
0	6828	78.5	6828	78.5
1	191	2.2	7019	80.7
2	182	2.1	7201	82.8
3	164	1.9	7365	84.7
4	159	1.8	7524	86.5
5	120	1.4	7644	87.9
6	130	1.5	7774	89.4
7	114	1.3	7888	90.7
8	112	1.3	8000	92.0
9	83	1.0	8083	93.0
10-14	273	3.2	8356	96.1
15-19	157	1.8	8513	97.9
20-24	94	1.1	8607	99.0
25-29	44	0.5	8651	99.5
30-47	40	0.2	8691	100.0

Table 8.55

Frequency distributions of home visits per case: Medical social worker

Visit	Number	Percent	Cum. Freq.	Cum. Percent
0	7587	87.2	7587	87.2
1	571	6.6	8158	93.8
2	309	3.6	8467	97.4
3	125	1.4	8592	98.8
4	50	0.6	8642	99.4
5	17	0.2	8659	99.6
6	16	0.2	8675	99.8
7	7	0.1	8682	99.8
8	5	0.0	8687	99.9
9	3	0.0	8690	99.9
10	1	0.0	8691	100.0

Table 8.56

Frequency distributions of home visits per case: Occupational therapists

Visit	Number	Percent	Cum. Freq.	Cum. Percent
0	8325	95.7	8325	95.7
1	64	0.7	8389	96.5
2	61	0.7	8450	97.2
3	50	0.6	8500	97.7
4	38	0.4	8538	98.2
5	26	0.3	8564	98.5
6	19	0.2	8583	98.7
7	9	0.1	8592	98.8
8	18	0.2	8610	99.0
9	15	0.2	8625	99.2
10-14	31	0.2	8656	99.5
15-19	16	0.2	8672	99.7
20-31	19	0.0	8691	100.0

Table 8.57

Frequency distributions of home visits per case: Speech therapists

Visit	Number	Percent	Cum. Freq.	Cum. Percent
0	8503	97.8	8503	97.8
1	41	0.5	8544	98.3
2	19	0.2	8563	98.5
3	14	0.2	8577	98.6
4	8	0.1	8585	98.7
5	6	0.1	8591	98.8
6	6	0.1	8597	98.9
7	8	0.1	8605	99.0
8	13	0.1	8618	99.1
9	11	0.1	8629	99.2
10-14	21	0.2	8650	99.5
15-19	15	0.1	8665	99.6
20-44	26	0.0	8691	100.0

Table 8.58

Mean results for all provider types: Cases

Provider type	Mean	SD
Total	20.60	25.76
Skilled nursing	11.66	14.64
Home health aide	6.06	14.44
Physical therapy	1.87	5.20
Occupational therapy	0.27	1.88
Speech therapy	0.23	2.36
Medical social worker	0.25	0.88

Table 8.59

Mean results for combined provider types: Cases

Combined provider types	Mean	SD
Skilled nursing	11.66	13.98
Nursing & home health aide	17.36	21.33
Nursing & other providers	14.15	15.13
All providers	19.92	23.32
All providers/ weighted (HHA = .67)	18.17	20.98

Table 8.60

Frequency distributions of days between first and last home visit: All providers

Visit Days	Number	Percent	Cum. Freq.	Cum. Percent
1-5	590	6.7	590	6.8
6-10	703	8.1	1293	14.9
11-15	782	8.9	2075	23.9
16-20	728	8.4	2803	32.2
21-25	790	9.1	3593	41.3
26-30	674	7.8	4267	49.1
31-40	948	10.8	5215	60.0
41-50	839	9.7	6054	69.6
51-60	756	8.5	6810	78.3
61-70	365	4.2	7175	82.5
71-80	217	2.2	7367	84.7
81-90	181	2.0	7573	87.1
91-100	156	1.6	7729	88.9
101-110	135	1.5	7864	90.4
111-120	145	1.8	8009	92.1
121-130	106	1.3	8115	93.3
131-140	55	0.6	8170	94.0
141-150	61	0.6	8231	94.7
151-160	35	0.3	8266	95.1
161-170	42	0.4	8308	95.5
171-180	31	0.2	8339	95.9
181-190	31	0.3	8370	96.3
191-200	17	0.0	8387	96.5
201-250	98	0.2	8485	97.6
251-300	45	0.1	8530	98.1
301-400	106	0.1	8636	99.3
401-500	24	0.0	8659	99.6
501-3310	32	0.0	8691	100.00

Table 8.61

Frequency distributions by length of episodes for all providers: Cases

Visit Days	Number	Percent	Cum. Number	Cum. Percent
Total	8,691	100.0	–	–
1 - 30	4,267	49.1	4,267	49.1
31 - 60	2,543	29.2	6,810	78.3
61 - 90	763	8.3	7,573	87.1
91 - 120	436	5.0	8,009	92.1
121 - 365	589	6.8	8,598	98.9
over 365	91	1.6	8,691	100.0

Table 8.62

Frequency distributions of three cohort classes for all providers: Cases

Cohorts	Number	Percent	Cum. Number	Cum. Percent
Total	8,691	100.0	–	–
under 30 days	4,267	49.1	4,267	49.1
31 - 120 days	3,742	42.5	8,009	91.6
over 120 days	682	8.4	8,691	100.0

Figure 8.1

Five functional status scales: Activities of daily living

GU ADL (9 levels) Score 9-27

- Bathing
- Dressing
- Toileting
- Transfer
- Continence (bowel/bladder control)
- Feeding (eating)
- Walking (mobility)
- Telephone (using)
- Medications (managing)

RUGS (4 levels) Score 3-10

- Toileting (1-3)
- Eating (1-4)
- Tube/Parental Feeding (1)
- Transfer (1-3)

Katz ADL Index (6 levels) Score 0-6

- Bathing
- Dressing
- Toileting
- Transfer
- Continence
- Feeding

Katz ADL Index Home Care (7 levels) Score 0-7

- Bathing
- Dressing
- Toileting
- Walking/mobility
- Transfer
- Continence
- Feeding

IADL Scale (2 levels) Score 0-6

- Telephone (using)
- Medications (managing)

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9. PREDICTIVE FINDINGS.

Overview

This section presents the findings for the categorical and regression models that were tested to develop a method for classifying home health Medicare patients. To accomplish this goal data on the actual resources used were measures of resource requirements. Since there is no agreement on which specific variables were valid predictors of resource use, data were collected on a large volume of cases and tested to explore the statistical significance of different models.

Five major types of classification variables (independent variables) along with two subcategories were considered to be major predictors of resource requirements: (a) demographics, (b) functional status, (c) nursing diagnoses, (d) nursing interventions, and (e) medical diagnosis. The two subcategories are: (a) discharge statuses of nursing diagnoses, (b) types of nursing interventions

Four variables were selected as measures of resource use (dependent variables): (a) nursing visits for first thirty days of episode (NVRN30), (b) weighted visits for first thirty days of episode (NVWT30), (c) nursing visits for total episode (NVWTALL), and (d) weighted visits for total episode (NVWTALL).

These variables were analyzed using regression and categorical models which are described and presented in tables and graphs. A summary of these analyses are shown in Table 9.1, where the overall R-squares for these models are compared and the percent of variance explained by the classification (independent variables) for the different measures of resources used (dependent variables).

The most significant findings are that the nursing diagnosis and nursing intervention home health care components were the best predictors of the number of nursing visits and all provider visits for the first thirty (30) days and the total episodes of care. On the other hand, demographics and functional status (ADLs) were the poorest predictors. The primary medical diagnosis or surgical procedure possessed marginal predictability for only the nursing visits for the first thirty (30) days of the episode.

Another significant finding emerged from a cohort model which classified the length of the episodes of care into three time periods for three different clusters of cases: (a) short term case (under 30 days), (b) intermediate case (30 to 120 days) and (c) long term case (120 to 365 days). Because of the way the data were collected it was not possible to predict resource requirements for each time period separately or to predict membership in each of the classes on admission to home health care. It was however, determined that the short term cases (under 30 days) comprised a different class of patient from those over thirty (30) days. Approximately fifty percent of the cases were less than thirty (30) days duration when resource use is the heaviest. The length of an episode of care was analyzed in the models in terms of the number of visits under thirty days (NVRN30) as well as the number of visits for the total episode (NVWTALL).

The linear regression and categorical regression models that were tested are now described in detail.

Demographic Regression Models

The four demographic regression models tested the ability of ten commonly used demographic variables to predict each of the four dependent variables (NVRN30, NVWT30, NVRNALL, and NVWTALL) which measured resource use. The detailed results of the four demographic regression models are presented in Table 9.2, along with an illustrated graph in Figure 9.1 which compared the regression coefficients for each of the independent demographic variables. It included the intercept term used to write a regression equation which can be used to predict the number of visits for a single case. The overall means for the entire sample for each dependent variable (7.51, 11.03, 11.51, and 17.93) were also included as a frame of reference to evaluate the magnitude of the regression coefficients.

Although each of the four regression models were statistically significant for the overall regression, the R-square for each model were relatively low (.015 .006 .008 .009) indicating that even using ten different demographic variables in each model explained only about one percent of the case to case variation in resource requirements. The large number of cases in the sample probably helped to achieve overall statistical significance even when the effects of the demographic variables are small. There was little difference between the ability to predict resource requirements in the first thirty days (NVRN30 and NVWT30) which was slightly higher when R-squares are compared with the models which predicted resource requirements in the total episode (NVRNALL and NVWTALL). There also were no consistent differences in the ability to predict nursing visits (NVRN30 and NVRNALL) compared with the ability to predict weighted total visits for all provider types (NVWT30 and NVWTALL).

Functional Status: GU ADL

The Georgetown GU ADL score included 9 items, including two IADLs, and ranged from 9 to 27 providing 19 categories for classification rather than the 8 used by RUGs ADL scale. The results of the four categorical models for the GU ADL measured on admission are presented in Table 9.4. They showed only a slight improvement over RUGs ADL, and were completely consistent with the findings for RUGs ADL.

The same dramatic contrast in R-square for nursing visits, .004 and .003, compared with all provider visits, .039 and .042 is illustrated in Figure 9.3. The graph helped to demonstrate the lack of smooth consistent increase in number of visits with higher ADL score. As with RUGs ADL, the predictions for the total episode were slightly better than those for the first thirty (30) days. Improving the precision of the ADL scale did not change the basic finding that ADL is not very useful for classifying nursing cases.

Nursing Diagnosis Components Regression Models

The four regression models developed for nursing diagnoses were based on the twenty (20) nursing diagnosis home health care (HHC) components which summarized the care requirements of each case. These models based on twenty (20) nursing diagnoses components were much more manageable than earlier efforts based on a more detailed list of one hundred forty-seven (147) nursing diagnoses or forty-two nursing diagnoses major categories. These lists had too many categories for effective regression analysis and also may have suffered from inconsistent use of multiple codes within the same category.

However, the regression models based on twenty (20) nursing diagnoses components were more effective than the list of nine human response patterns or list of eleven functional health patterns of nursing diagnoses which were abandoned for purposes of regression modeling. Because each case may have multiple nursing diagnosis components, each component was treated as a dummy variable in the regression models and had its own regression coefficients. The coefficient for each component compares the number of visits for cases which include that component with number of visits for a case which lack that component, adjusting for the effects of other coexisting components.

As shown in Table 9.5, the overall R-squares showed twice the predictive power of the best functional status (ADL) models, with all four models in the 6 to 7 percent range. Predictions in the first thirty (30) days (Figure 9.4) were better than for the total episode (.067 and .069 versus .061 and .068). Predictions for weighted all provider visits were slightly better than for nursing visits alone, but all four models behaved in a similar fashion unlike the discrepancies seen for the ADL models.

Approximately half of the individual components had statistically significant coefficients and the relative magnitudes were similar in all models. The nutritional nursing diagnosis component tended to decrease the number of visits, while tissue integrity, metabolic, and physical regulation components increased the number of visits. The size of the coefficients in different models varied due to the variation in overall mean number of visits and it was not unusual for a single nursing diagnosis component to increase total visits predicted by over 30 percent of the mean visits (for example, metabolic had a coefficient of 6.60 with an overall mean of 17.945 in the total episode for all provider visits model).

The twenty (20) nursing diagnosis HHC components are clearly an effective tool for predicting home health visits by nurses as well as all provider visits and had greater predictive power than ADLs alone.

Number of Nursing Diagnosis Components Categorical Models

The number of nursing diagnosis components per case were used to construct simple categorical models using the count of nursing diagnosis components for cases as a crude index of the complexity of the cases, ignoring the important differences already demonstrated above between the different components. This simplistic model was not a good predictor of home visits. Like the functional status ADL models, it was better for the total episode than for the first thirty (30) days and did better for all providers than for nursing visits alone.

It is noteworthy that the individual component means in Tables 9.6 and 9.7 showed consistent increases in mean visits with increasing numbers of nursing diagnosis components. The concept that a case with more nursing diagnosis components needs more visits was adequately proven by these models; however, models based on the specific individual nursing diagnosis components were much more accurate predictors of the number of visits for each case.

Discharge Status Pattern Categorical Models

Discharge status alone, ignoring the specific nursing diagnosis components, was examined using a categorical model (ANOVA) based on the combinations of statuses found in each case. Cases were thus categorized as all nursing diagnoses improved, deteriorated, or various combinations of improved, stabilized, and deteriorated.

The R-squares from these models were very low, and as seen in Table 9.8 There was no clear pattern or trend in mean visits within or between models. While discharge status contributes information to specific nursing diagnosis components, it has little or no usefulness on its own.

Nursing Diagnosis Components by Discharge Status Regression Models

Each of the twenty (20) nursing diagnosis components was also coded into three levels of discharge status (improved, no change, deteriorated) which could be interpreted as treatment goals or expected outcomes for the case. This permitted construction of more complex regression models based on sixty (60) nursing diagnosis components rather than twenty (20). Increasing the complexity of the model produced consistent and noticeable improvement in all models as reflected by the increase in R-squares (.061 to .073, .068 to .081, .067 to .079, and .069 to .094). The first thirty (30) days all provider visits R-square of .094 was three times as effective as the comparable RUGs ADL model with an R-square of .03.

The individual regression coefficients shown in Tables 9.9, 9.10, 9.11, and 9.12 contained many statistically significant findings with most of the larger positive or negative coefficients for cases which showed a poor outcome (discharge status = 3) reflecting that much of home health care was not directed at cure, rehabilitation, or stabilization, but was concerned with coping with deteriorating conditions.

While it is a little more difficult to code cases on two dimensions of nursing diagnosis (component and treatment goal or expected outcome), the improvement in the accuracy of prediction may be worth the effort in some situations.

Nursing Intervention Components Regression Models

The nursing intervention components regression models as shown in Table 9.13 were similar to the nursing diagnoses models and were based on twenty-two (22) home health care (HHC) components, each component was used as a dummy regression variable. The nursing intervention components models, illustrated in Figure 9.5, were even more effective than the nursing diagnoses models at predicting visits. Like the nursing diagnoses components, the nursing intervention components did better in the first thirty (30) days than the total episode (.105 and .061 versus. .085 and .062). Nursing intervention components alone were better predictors of nursing visits than total provider visits (.105 and .085 versus .061 and .062) which contrasted with nursing diagnosis components where all provider visits predictions were slightly better. The coding of nursing interventions was probably more consistent in this retrospective study, which may account for some of the differences.

The individual components showed similar results in all four models with wound care and metabolic component care leading all four lists with large coefficients which reflected increased need for care. Role relationship consistently was related to decreased visits and several other components such as fluid volume, urinary elimination, and tissue integrity all had positive effects on visits. Nursing intervention components are thus another very effective method for predicting home care visits.

Number of Nursing Interventions Components Categorical Models

A similar simple index based on number of nursing intervention components per case was also tested with a set of categorical models and yielded the same results as the number of nursing diagnosis component models (Tables 9.14 and 9.15). In all cases, more nursing intervention components increased the mean number of visits. However, typically, only two percent of the variance was explained by the model.

Type of Nursing Intervention Patterns Regression Models

As was done previously for discharge status, type of nursing intervention was combined into patterns to create a categorical model which compared cases such as assess only or care only, to more complex cases with Assess, Care, Manage, and Teach in the same case.

The R-squares were a little stronger than for discharge status, but basically in the three to four percent range which was similar to RUGs ADL or GU ADL. Table 9.16 showed no clear pattern in mean visits by pattern though there was a small trend for cases with more types to have more visits. The more complex patterns were seen only in cases with many nursing interventions. It was concluded that this type of model has little usefulness. It reinforced the strengths of other models and revealed that this simplistic model works about as well as RUGs ADL or GU ADL.

Nursing Intervention Components by Four Types of Intervention Regression Models

The best regression models developed in this study were found with the refinement of the nursing intervention component models into the four types of nursing interventions: (a) Assess, (b) Care, (c) Manage, (d) Teach. These complex models had 88 dummy variables (22 components broken into 4 types) and yielded an R-square as high as .15 which was over four times higher as the baseline RUGs ADL or GU ADL, or the medical diagnosis models. As in the twenty-two (22) nursing intervention component models, the effects of nursing intervention components were greater in the first thirty (30) days than the total episode and greater for nursing visits than all provider visits.

The individual regression coefficients in Tables 9.17, 9.18, 9.19, and 9.20, include many significant findings. Of particular note was the importance of nursing intervention type three which deals with manage patient care. For some nursing intervention components, **manage** care led to highly positive coefficients reflecting an increase in visits, while in other components, **manage** was associated with a highly negative coefficient or a decrease in visits.

The large number of independent variables made these regression models unwieldy and precluded combinations of these models with other models such as demographics. Perhaps it will be possible in the future to combine several of these 88 categories into clusters with similar behavior so as to reduce the combined nursing intervention and type nursing interval model to a more manageable size. The strength of these predictions clearly shows that nursing intervention components (which follow the nursing diagnosis components) are the best predictors of number of visits for a home health care case.

Medical Diagnosis Categorical Models

The twenty (20) primary medical diagnosis or surgical procedure groups based on the main headings of the ICD-9-CM were used to construct categorical models since each case has only one primary condition with the surgical condition given priority over a medical condition if both were entered for a case.

As shown by the R-squares, medical diagnosis was a much weaker predictor of visits than nursing diagnosis and performed slightly better than the best ADL models. Predictions were best for the first thirty (30) days (.054 and .037 versus .032 and .022) and were better for nursing visits than total provider visits (.054 and .032 versus .037 and .022).

As shown in Table 9.21 and illustrated in Figure 9.6, the mean number of visits for each medical diagnosis followed similar patterns in all four models. The highest mean percentages were for the three most frequent conditions: **operations of integumentary system, skin conditions**, and **operations of the musculoskeletal system.** The values for surgical cases were generally higher than for the medical cases.

The use of a single medical category per case limited its predictive power compared to the nursing diagnosis or intervention components which more completely describes the number of visits for the case and reflected important differences between cases in the same medical category with very different nursing care visits.

Nursing Diagnosis Components and Demographics Regression Models

The twenty (20) nursing diagnosis HHC components were combined with the ten demographic variables to develop a stronger regression model by refining the nursing diagnosis components prediction with the additional information given by the demographics. These models showed an increase of about one percent in the accuracy of the predictions as reflected by the R-squares when the R-squares of the nursing diagnosis models were compared to the combined models (ie. NVRN total episode .066 versus .061). The patterns between the four models remained similar with better predictions in the first thirty (30) days than total episode and better predictions for nursing visits than total provider visits.

The individual regression coefficients shown in Tables 9.22 and 9.23, indicated that the nursing diagnosis components have a stronger effect on visits than individual demographic variables. The results in the combined models were similar to the finding for demographics or nursing diagnosis alone. When these two sets of independent variables were considered as possible predictors of resource requirements the three significant nursing diagnosis components still remained as having the highest coefficients and the most significant p values for the four dependent variables.

Combining variables from different sets of regression models did improve the performance of the overall model, but it is of note that using nursing intervention components instead of nursing diagnosis components had a greater effect than combining nursing diagnosis component with demographics.

Nursing Intervention Components and Demographics Regression Models

The impact of adding demographic variables to the successful nursing intervention components models showed even less improvement in R-squares than was seen when demographics were added to nursing diagnosis. The changes were small (.083 to .089, .062. 066, .105 to .114, .062 to 064), though the best model, nursing visits for first 30 days, had an impressive 11.35 percent variance explained.

As seen before for nursing diagnosis components and demographics, Tables 9.24, 9.25, 9.26, and 9.27 again showed the nursing intervention components to be similar to the original model; the demographic variables had little effect compared to the intervention components.

Nursing Diagnosis and Nursing Intervention Components Regression Models

Combining the twenty (20) nursing diagnosis components with the twenty-two (22) nursing intervention components produced a set of regression models with very good R-squares (.102 .096 .121 .099) with the same pattern seen previously for nursing intervention components: better in first thirty (30) days than total episode, better for nursing visits than all providers. Tables 9.28 and 9.29 showed that the effects of the nursing intervention components were generally greater than the nursing diagnosis components, though both were important. The limitations of the retrospectively coded data used in this analysis preclude strong statements about the differences between nursing diagnosis and intervention components.

In a prospective study, the agreement in coding should be highly reliable and the behavior of the individual nursing diagnosis or intervention components models and the combined models should be more alike than was found in this study. With improvements in the original coding of nursing diagnosis and intervention components, there should be less need for combined models in the future and the nursing diagnosis component models should be as effective as the nursing intervention component models.

Nursing Diagnosis and Intervention Components, and Demographics Regression Model

The final set of regression models which was tested combined all three of the best models into a single large model using nursing diagnosis, nursing intervention components, and demographics. The improvements in R-squares over the nursing diagnosis and intervention component models were small and more importantly, these combination models were not as good as the nursing intervention components by type model which remained the best predictor of visits as judged by the R-squares.

Tables 9.30, 9.31, 9.32, and 9.33 presented the individual regression coefficients for each independent variable from all three sets. The results remained consistent with the individual models and confirmed the strength of the individual variables. In general, nursing intervention components were better predictors than the nursing diagnosis components. Self-care and pets in home remain important demographic variables which did add to the amount of variance explained by nursing diagnoses and interventions. Most of the coefficients were not statistically significant and could not be considered greater than or smaller than zero.

This large combined model was run primarily to explore the data and not with the intention of using it to classify cases and predict visits in the real world. It demonstrates the value of selecting a strong set of independent variables and the benefits of combining a few selected demographic items with an appropriate set of nursing diagnosis and intervention components of home health nursing care.

Table 9.1

Comparison of R-square results of regression and categorical models
by first thirty days and total episode: Classification variables

Regression/Categorical Models	First thirty days		Total Episode	
	Nursing visits	All provider visits	Nursing visits	All provider visits
Demographics	.0154	.0060	.0080	.0089
Functional status/RUGS ADL	.0029	.0304	.0022	.0368
Functional status/GU ADL	.0040	.0391	.0028	.0422
Nursing diagnosis components	.0672	.0692	.0606	.0677
Nursing diagnosis number	.0087	.0288	.0193	.0380
Nursing diagnosis/discharge status patterns	.0145	.0211	.0188	.0220
Nursing diagnosis discharge status	.0786	.0936	.0729	.0810
Nursing interventions components	.1046	.0612	.0847	.0620
Nursing intervention number	.0196	.0233	.0206	.0226
Nursing intervention/types of intervention patterns	.0388	.0272	.0380	.0299
Nursing intervention/types	.1464	.0807	.1434	.1094
Medical diagnosis or surgical procedure groups	.0535	.0370	.0322	.0218
Nursing diagnosis components/ demographics	.0801	.0740	.0664	.0725
Nursing intervention components/ demographics	.1135	.0644	.0891	.0662
Nursing diagnosis/nursing intervention components	.1206	.0992	.1016	.0963
Nursing diagnosis/nursing intervention component/ demographics	.1298	.1028	.1059	.0996

Table 9.2
Regression results as predictors of nursing and all provider visits, by first thirty days and total episode: Demographic variables

First thirty days of episode

Nursing visits

Rank	Variable	Coefficient	P Value
1	Pets in Home	0.85	0.00
2	Self-care	0.83	0.00
3	Comprehends	0.61	0.00
4	Married	0.42	0.01
5	Lives alone	-0.02	0.90
6	Age	-0.04	0.00
7	White	-0.07	0.65
8	Male	-0.10	0.45
9	House	-0.13	0.35
10	Communicates	-0.91	0.00
R^2		0.015	
mean		7.51	
intercept		10.88	

All provider visits

Rank	Variable	Coefficient	P Value
1	Pets in home	0.86	0.00
2	Married	0.68	0.00
3	Comprehends	0.51	0.02
4	Self-care	0.10	0.67
5	House	0.06	0.76
6	Age	-0.03	0.00
7	Communicate	-0.08	0.75
8	Lives alone	-0.19	0.46
9	White	-0.47	0.03
10	Male	-0.59	0.00
R^2		0.006	
mean		11.03	
intercept		12.83	

Total episode

Nursing visits

Rank	Variable	Coefficient	P Value
1	Pets in home	2.06	0.00
2	Comprehends	0.99	0.01
3	Self-care	0.86	0.03
4	Married	0.53	0.14
5	House	0.47	0.15
6	Lives alone	0.12	0.78
7	White	0.06	0.87
8	Age	-0.08	0.00
9	Male	-0.14	0.65
10	Communicates	-1.02	0.01
R^2		0.008	
mean		11.51	
intercept		16.52	

All provider visits

Rank	Variable	Coefficient	P Value
1	Pets in home	2.43	0.00
2	Comprehends	1.33	0.01
3	Married	1.30	0.02
4	House	1.26	0.01
5	Communicate	0.94	0.14
6	Age	-0.07	0.00
7	Self-care	-0.32	0.59
8	White	-0.39	0.47
9	Lives alone	-0.39	0.54
10	Male	-1.14	0.02
R^2		0.009	
mean		17.93	
intercept		19.58	

Table 9.3
Mean nursing and provider visits, by first thirty days and total episode: RUGS activities of daily living

First thirty days of episode

Nursing visits				All provider visits			
RUGS ADL scores	N	Mean	SD	RUGS ADL scores	N	Mean	SD
3	2876	7.90	6.04	3	2876	9.39	6.87
4	1281	7.44	6.25	4	1281	10.56	7.76
5	2039	7.38	5.44	5	2039	12.23	8.24
6	958	7.05	4.65	6	958	11.49	8.16
7	374	7.41	4.90	7	374	13.74	9.17
8	316	7.53	6.14	8	316	13.30	10.00
9	481	7.04	5.20	9	481	12.43	9.78
10	63	7.90	4.77	10	63	11.25	7.80
R^2		0.003		R^2		0.030	
mean		7.521		mean		11.027	
n		8388		n		8388	

Total episode

Nursing visits				All provider visits			
RUGS ADL scores	N	Mean	SD	RUGS ADL scores	N	Mean	SD
3	2877	11.38	13.03	3	2877	13.81	15.24
4	1282	10.84	13.43	4	1282	15.81	16.73
5	2039	11.57	12.97	5	2039	20.16	20.50
6	959	11.42	13.14	6	959	20.12	22.85
7	374	12.65	13.53	7	374	24.35	23.82
8	316	13.43	14.66	8	316	26.08	26.67
9	481	11.77	12.10	9	481	23.44	27.01
10	63	15.30	13.77	10	63	24.33	27.21
R^2		0.002		R^2		0.037	
mean		11.535		mean		17.942	
n		8391		n		8391	

Table 9.4
Mean nursing and all provider visits, by first thirty days and total episode: GU activities of daily living (ADL)

First thirty days of episode

	Nursing visits				All provider visits		
GU ADL scores	N	Mean	SD	GU ADL scores	N	Mean	SD
9	582	7.95	6.34	9	582	8.44	6.63
10	665	7.92	6.53	10	665	8.72	6.86
11	679	7.84	6.39	11	679	9.36	7.13
12	660	7.43	5.78	12	660	9.74	6.84
13	684	7.66	5.78	13	684	11.13	7.62
14	745	7.25	5.16	14	745	11.60	7.31
15	698	7.95	5.78	15	698	12.75	8.45
16	497	7.79	6.17	16	497	12.19	8.50
17	375	7.40	5.31	17	375	11.76	8.15
18	327	7.10	4.58	18	327	11.27	8.00
19	223	6.89	4.46	19	223	11.63	8.13
20	169	7.64	5.26	20	169	12.44	8.70
21	143	8.08	6.05	21	143	14.24	10.34
22	133	7.36	4.41	22	133	12.68	8.87
23	120	8.19	6.85	23	120	14.92	11.28
24	118	7.50	4.24	24	118	13.05	8.16
25	109	6.47	3.95	25	109	12.65	9.17
26	123	7.01	5.63	26	123	12.26	9.71
27	405	7.03	5.26	27	405	11.99	9.68
R^2		0.004		R^2		0.039	
mean		7.58		mean		11.038	
n		7455		n		7455	

Total episode

	Nursing visits				All provider visits		
GU ADL scores	N	MEAN	SD	GU ADL scores	N	MEAN	SD
9	583	10.96	12.07	9	583	11.95	13.39
10	665	11.27	13.15	10	665	12.72	15.35
11	679	11.48	15.94	11	679	13.72	17.18
12	660	11.01	13.41	12	660	14.57	15.67
13	684	11.45	13.44	13	684	17.00	17.54
14	746	10.93	12.10	14	746	17.97	17.15
15	698	12.07	12.61	15	698	20.27	19.38
16	498	12.40	12.59	16	498	20.62	19.72
17	375	12.01	14.30	17	375	20.51	23.96
18	327	11.33	11.20	18	327	19.09	20.71
19	223	10.99	11.07	19	223	20.19	22.41
20	169	12.67	11.41	20	169	22.15	21.08
21	143	13.06	12.50	21	143	25.37	24.97
22	133	11.92	10.75	22	133	21.57	20.34
23	120	13.69	16.17	23	120	28.08	30.01
24	118	14.09	13.37	24	118	27.09	26.31
25	109	11.05	12.20	25	109	23.30	24.76
26	123	12.17	11.03	26	123	22.80	22.91
27	405	12.13	13.00	27	405	23.61	28.12
R^2		0.003		R^2		0.042	
mean		11.626		mean		17.962	
n		7458		n		7458	

Table 9.5
Regression results as predictors of nursing and all provider visits, by first thirty days and total episode: Nursing diagnosis home health care components

First thirty days of episode

Nursing visits				All provider visits			
Rank	Variable	Coefficient	P value	Rank	Variable	Coefficient	P value
1	Tissue integrity	2.69	0.00	1	Tissue integrity	2.72	0.00
2	Physical regulation	1.25	0.00	2	Self-care	2.13	0.00
3	Metabolic	1.20	0.00	3	Role relationship	1.81	0.00
4	Coping	0.46	0.07	4	Activity	1.59	0.00
5	Fluid volume	0.44	0.02	5	Metabolic	1.44	0.00
6	Cognitive	0.44	0.00	6	Physical regulation	0.98	0.00
7	Self-concept	0.39	0.16	7	Cognitive	0.66	0.00
8	Health behavior	0.32	0.08	8	Health behavior	0.65	0.01
9	Medication	0.25	0.36	9	Coping	0.57	0.11
10	Digestive	0.21	0.15	10	Sensory	0.43	0.05
11	Tissue perfusion	0.08	0.60	11	Fluid volume	0.29	0.28
12	Respiratory	0.07	0.62	12	Medication	0.24	0.53
13	Sensory	0.07	0.67	13	Tissue perfusion	0.20	0.36
14	Cardiac output	0.02	0.88	14	Digestive	0.15	0.48
15	Self-care	-0.11	0.45	15	Urinary elimination	0.04	0.87
16	Role relationship	-0.20	0.51	16	Self-concept	-0.05	0.91
17	Nutritional	-0.36	0.03	17	Cardiac output	-0.18	0.35
18	Injury/safety	-0.43	0.04	18	Respiratory	-0.40	0.05
19	Urinary elimination	-0.50	0.00	19	Injury/safety	-0.51	0.08
20	Activity	-0.64	0.00	20	Nutritional	-0.92	0.00
R^2		0.067		R^2		0.069	
mean		7.519		mean		11.032	
intercept		6.307		Intercept		8.255	

Total episode

Nursing visits				All provider visits			
Rank	Variable	Coefficient	P value	Rank	Variable	Coefficient	P value
1	Tissue integrity	5.20	0.00	1	Metabolic	6.60	0.00
2	Metabolic	4.25	0.00	2	Tissue integrity	5.63	0.00
3	Physical regulation	3.01	0.00	3	Self-care	4.63	0.00
4	Tissue perfusion	1.06	0.00	4	Role relationship	3.80	0.00
5	Coping	1.06	0.07	5	Physical regulation	3.61	0.00
6	Medication	1.00	0.11	6	Urinary elimination	2.81	0.00
7	Sensory	0.96	0.01	7	Activity	2.78	0.00
8	Fluid volume	0.86	0.05	8	Tissue perfusion	2.05	0.00
9	Urinary elimination	0.61	0.09	9	Medication	1.90	0.05
10	Health behavior	0.52	0.22	10	Sensory	1.61	0.00
11	Digestive	0.49	0.15	11	Coping	1.17	0.19
12	Self-concept	0.46	0.48	12	Health behavior	0.69	0.29
13	Cardiac output	0.41	0.20	13	Digestive	0.68	0.19
14	Cognitive	0.35	0.21	14	Cognitive	0.58	0.17
15	Respiratory	0.24	0.47	15	Fluid volume	0.35	0.60
16	Self-care	0.12	0.71	16	Cardiac output	0.22	0.64
17	Injury/safety	-0.39	0.42	17	Respiratory	-0.34	0.51
18	Nutritional	-0.40	0.29	18	Injury/safety	-0.51	0.48
19	Role relationship	-0.44	0.53	19	Self-concept	-0.67	0.50
20	Activity	-0.73	0.01	20	Nutritional	-1.27	0.03
R^2		0.060		R^2		0.068	
mean		11.525		mean		17.947	
intercept		8.015		intercept		10.795	

Table 9.6

Mean results of nursing and all provider visits, by first thirty days: Number of nursing diagnosis (RN Dx) home health care components

Nursing visits				All provider visits			
RN Dx		Mean	SD	RN Dx		Mean	SD
0	131	6.75	4.77	0	131	9.94	7.54
1	945	7.08	6.12	1	945	9.13	7.30
2	1654	7.18	5.74	2	1654	9.88	7.51
3	1740	7.41	5.95	3	1740	10.72	7.84
4	1464	7.21	5.03	4	1464	10.99	7.88
5	1002	7.95	5.24	5	1002	12.03	7.87
6	659	7.78	5.17	6	659	12.20	8.28
7	416	8.34	6.40	7	416	13.46	9.33
8	252	9.01	5.84	8	252	13.64	8.67
9	155	9.10	7.54	9	155	14.63	10.40
10	68	8.62	4.51	10	68	14.19	9.30
11	32	9.22	5.77	11	32	13.59	9.97
12	20	7.60	3.72	12	20	13.42	8.42
13	10	10.00	6.41	13	10	18.29	7.62
14	3	13.00	7.00	14	3	22.82	5.85
R^2		0.009		R^2		0.028	
mean		7.52		mean		11.03	
n		8551		n		8551	

Table 9.7

Mean results of nursing and all provider visits, by total episode: Number of nursing diagnosis (RN Dx) home health care components

Nursing visits				All provider visits			
RN Dx		Mean	SD	RN Dx		Mean	SD
0	131	9.22	9.51	0	131	15.05	17.50
1	945	9.83	11.97	1	945	13.12	15.18
2	1655	10.09	11.62	2	1655	14.61	15.90
3	1741	11.22	13.73	3	1741	17.08	19.26
4	1464	10.88	11.03	4	1464	17.99	19.49
5	1002	12.91	15.23	5	1002	20.59	22.49
6	659	12.33	12.66	6	659	20.03	19.67
7	417	14.43	14.24	7	417	25.18	26.47
8	252	14.77	13.25	8	252	22.90	19.30
9	155	18.75	20.49	9	155	31.36	30.03
10	68	15.68	13.37	10	68	26.47	24.30
11	32	19.88	18.99	11	32	31.35	30.34
12	20	17.05	16.36	12	20	38.30	41.51
13	10	12.40	8.60	13	10	27.47	17.35
14	3	17.00	11.53	14	3	28.83	11.21
R^2		0.019		R^2		0.038	
mean		11.53		mean		17.95	
n		8554		n		8554	

Table 9.8

Mean results of nursing and all provider visits, by first thirty days and and total episode: Nursing diagnosis discharge status patterns*

First thirty days

	Nursing visits				All provider visits		
RN Dx Disch Status Pattern	N	Mean	SD	RN Disch Status Pattern	N	Mean	SD
Imp	3069	7.74	5.93	Imp	3069	11.47	8.22
Imp/Stb	2658	7.73	5.64	Imp/Stb	2658	11.50	8.08
Imp/Stb/Det	540	8.54	5.95	Imp/Stb/Det	540	12.57	8.15
Imp/Det	271	8.42	5.53	Imp/Det	271	12.07	7.94
Stb	688	5.87	4.25	Stb	688	8.21	6.40
Stb/Det	321	7.36	5.68	Stb/Det	321	10.41	8.11
Det	427	6.11	5.37	Det	427	8.55	7.63
	R^2		0.015		R^2		0.021
	mean		7.55		mean		11.09
	n		7977		n		7977

Total episode

	Nursing visits				All provider visits		
RN Dx Disch Status Pattern	N	Mean	SD	RN Dx Disch Status Pattern	N	Mean	SD
Imp	3069	11.00	12.01	Imp	3069	17.08	17.31
Imp/Stb	2660	11.98	13.26	Imp/Stb	2660	19.14	20.85
Imp/Stb/Det	540	16.44	18.77	Imp/Stb/Det	540	25.72	27.51
Imp/Det	271	14.95	16.55	Imp/Det	271	22.63	24.20
Stb	688	8.37	9.56	Stb	688	12.48	15.45
Stb/Det	322	12.16	13.62	Stb/Det	322	18.40	22.26
Det	427	9.83	11.19	Det	427	14.66	18.25
	R^2		0.019		R^2		0.022
	mean		11.59		mean		18.07
	n		7977		n		7977

*Imp = Improved, Stb = Stabilized, Det = Deteriorated

Table 9.9

Regression results as predictors of nursing visits, by first thirty days: Nursing diagnosis home health care components discharge statuses

Type	Variable	Nursing visits Coefficient	 P value
Deteriorated	Role relationship	3.25	0.01
Improved	Tissue integrity	2.80	0.00
Deteriorated	Tissue integrity	2.80	0.00
Deteriorated	Metabolic	2.76	0.00
Deteriorated	Physical regulation	2.26	0.00
Improved	Metabolic	1.43	0.00
Stabilized	Tissue integrity	1.36	0.00
Improved	Physical regulation	1.32	0.00
Stabilized	Medication	1.01	0.06
Deteriorated	Health behavior	0.97	0.11
Improved	Fluid volume	0.78	0.00
Stabilized	Metabolic	0.77	0.00
Improved	Coping	0.63	0.06
Improved	Cognitive	0.62	0.00
Stabilized	Self-concept	0.57	0.29
Improved	Self-concept	0.40	0.29
Deteriorated	Digestive	0.39	0.37
Deteriorated	Fluid volume	0.35	0.42
Stabilized	Digestive	0.34	0.20
Deteriorated	Self-concept	0.33	0.72
Improved	Health behavior	0.31	0.16
Stabilized	Physical regulation	0.31	0.47
Improved	Tissue perfusion	0.26	0.24
Improved	Respiratory	0.24	0.24
Improved	Digestive	0.22	0.23
Improved	Sensory	0.20	0.32
Deteriorated	Coping	0.20	0.75
Stabilized	Respiratory	0.19	0.42
Deteriorated	Sensory	0.18	0.66
Stabilized	Cardiac output	0.16	0.42
Improved	Self-care	0.15	0.45
Deteriorated	Injury/safety	0.13	0.87
Deteriorated	Medication	0.11	0.92
Stabilized	Tissue perfusion	0.06	0.79
Stabilized	Sensory	−0.00	1.00
Deteriorated	Activity	−0.03	0.92
Improved	Cardiac output	−0.08	0.66
Deteriorated	Cardiac output	−0.09	0.80
Improved	Role relationship	−0.10	0.83
Deteriorated	Tissue perfusion	−0.15	0.71
Stabilized	Role relationship	−0.16	0.74

Table 9.9 (cont.)

Regression results as predictors of nursing visits, by first thirty days: Nursing diagnosis home health care components discharge statuses

		Nursing visits	
Type	Variable	Coefficient	P value
Improved	Nutritional	−0.18	0.41
Stabilized	Fluid volume	−0.18	0.64
Improved	Medication	−0.20	0.56
Stabilized	Nutritional	−0.22	0.49
Improved	Urinary elimination	−0.24	0.27
Stabilized	Health behavior	−0.24	0.51
Deteriorated	Cognitive	−0.25	0.46
Stabilized	Self-care	−0.28	0.26
Stabilized	Coping	−0.29	0.56
Stabilized	Cognitive	−0.30	0.12
Stabilized	Injury/safety	−0.35	0.35
Stabilized	Urinary elimination	−0.44	0.07
Improved	Injury/safety	−0.49	0.07
Deteriorated	Urinary elimination	−0.60	0.16
Stabilized	Activity	−0.63	0.00
Deteriorated	Respiratory	−0.64	0.05
Deteriorated	Self-care	−0.67	0.07
Improved	Activity	−0.85	0.00
Deteriorated	Nutritional	−0.90	0.02
	R^2		0.079
	mean		7.53
	intercept		6.39

Table 9.10

Regression results as predictors of nursing visits, all provider visits: Nursing diagnosis home health care components discharge statuses

All provider visits

Type	Variable	Coefficient	P value
Deteriorated	Role relationship	6.39	0.00
Deteriorated	Tissue integrity	3.28	0.00
Improved	Role relationship	3.25	0.00
Deteriorated	Metabolic	2.94	0.00
Improved	Tissue integrity	2.84	0.00
Improved	Self-care	2.77	0.00
Stabilized	Medication	2.27	0.00
Deteriorated	Physical regulation	2.13	0.02
Deteriorated	Health behavior	2.11	0.01
Improved	Activity	1.98	0.00
Improved	Metabolic	1.80	0.00
Stabilized	Self-care	1.67	0.00
Improved	Physical regulation	1.18	0.00
Improved	Coping	1.16	0.01
Deteriorated	Activity	1.03	0.02
Stabilized	Tissue integrity	0.98	0.01
Improved	Fluid volume	0.92	0.01
Stabilized	Metabolic	0.89	0.02
Improved	Cognitive	0.82	0.00
Improved	Sensory	0.78	0.01
Deteriorated	Self-concept	0.72	0.58
Improved	Health behavior	0.65	0.04
Deteriorated	Self-care	0.59	0.26
Stabilized	Digestive	0.53	0.15
Stabilized	Self-concept	0.52	0.48
Deteriorated	Sensory	0.52	0.37
Improved	Tissue perfusion	0.44	0.15
Improved	Urinary elimination	0.43	0.16
Stabilized	Urinary elimination	0.38	0.27
Deteriorated	Urinary elimination	0.34	0.57
Stabilized	Role relationship	0.20	0.77
Stabilized	Activity	0.19	0.50
Improved	Digestive	0.18	0.48
Deteriorated	Coping	0.13	0.88
Stabilized	Cardiac output	0.11	0.70
Deteriorated	Medication	0.08	0.96
Deteriorated	Fluid volume	0.08	0.90
Deteriorated	Digestive	0.03	0.97
Stabilized	Health behavior	−0.03	0.96
Stabilized	Tissue perfusion	−0.05	0.87
Stabilized	Nutritional	−0.07	0.88

Table 9.10 (cont.)

Regression results as predictors of nursing visits, all provider visits: Nursing diagnosis home health care components discharge statuses

All provider visits

Type	Variable	Coefficient	P value
Deteriorated	Tissue perfusion	−0.07	0.90
Improved	Cardiac output	−0.17	0.55
Stabilized	Physical regulation	−0.28	0.64
Improved	Respiratory	−0.29	0.31
Stabilized	Injury/safety	−0.30	0.57
Stabilized	Respiratory	−0.35	0.31
Deteriorated	Injury/safety	−0.35	0.74
Improved	Self-concept	−0.37	0.49
Deteriorated	Cognitive	−0.43	0.37
Stabilized	Sensory	−0.43	0.27
Stabilized	Cognitive	−0.49	0.87
Improved	Injury/safety	−0.52	0.17
Stabilized	Fluid volume	−0.76	0.16
Deteriorated	Cardiac output	−0.76	0.12
Improved	Nutritional	−0.81	0.01
Improved	Medication	−0.93	0.05
Deteriorated	Respiratory	−0.96	0.03
Stabilized	Coping	−1.00	0.15
Deteriorated	Nutritional	−1.01	0.06
	R^2		0.094
	mean		11.05
	intercept		8.47

Table 9.11

Regression results as predictors of nursing visits, by total episode: Nursing diagnosis home health care components discharge statuses

	Nursing visits		
Type	Variable	Coefficient	P value
Deteriorated	Physical regulation	8.99	0.00
Deteriorated	Tissue integrity	6.84	0.00
Deteriorated	Metabolic	6.70	0.00
Improved	Tissue integrity	5.30	0.00
Improved	Metabolic	4.74	0.00
Deteriorated	Medication	4.34	0.11
Stabilized	Metabolic	3.57	0.00
Stabilized	Medication	3.34	0.01
Deteriorated	Tissue perfusion	2.93	0.00
Deteriorated	Role relationship	2.49	0.36
Stabilized	Tissue integrity	2.47	0.00
Stabilized	Physical regulation	2.47	0.01
Deteriorated	Sensory	2.05	0.03
Improved	Physical regulation	2.05	0.00
Improved	Fluid volume	1.69	0.00
Stabilized	Urinary elimination	1.38	0.01
Deteriorated	Health behavior	1.21	0.39
Stabilized	Coping	1.14	0.32
Improved	Tissue perfusion	1.10	0.03
Deteriorated	Injury/safety	1.07	0.54
Stabilized	Self-concept	1.07	0.39
Improved	Coping	1.01	0.19
Improved	Health behavior	0.84	0.10
Stabilized	Sensory	0.80	0.21
Improved	Self-concept	0.79	0.37
Improved	Cognitive	0.76	0.01
Stabilized	Cardiac output	0.60	0.19
Stabilized	Digestive	0.58	0.34
Deteriorated	Self-care	0.56	0.51
Stabilized	Tissue perfusion	0.54	0.33
Deteriorated	Activity	0.53	0.45
Improved	Sensory	0.51	0.28
Stabilized	Injury/safety	0.47	0.59
Improved	Digestive	0.44	0.29
Deteriorated	Fluid volume	0.44	0.67
Deteriorated	Cardiac output	0.43	0.59
Deteriorated	Digestive	0.43	0.67
Improved	Urinary elimination	0.35	0.49
Improved	Respiratory	0.29	0.54
Stabilized	Health behavior	0.25	0.77
Improved	Cardiac output	0.14	0.75

Table 9.11 (cont.)

Regression results as predictors of nursing visits, by total episode: Nursing diagnosis home health care components discharge statuses

		Nursing visits	
Type	Variable	Coefficient	P value
Stabilized	Respiratory	−0.01	0.98
Improved	Self–care	−0.05	0.91
Deteriorated	Self–concept	−0.11	0.96
Improved	Role relationship	−0.16	0.88
Stabilized	Nutritional	−0.17	0.82
Stabilized	Self–care	−0.24	0.68
Stabilized	Role relationship	−0.32	0.77
Improved	Medication	−0.32	0.68
Deteriorated	Urinary elimination	−0.33	0.74
Deteriorated	Respiratory	−0.47	0.53
Improved	Nutritional	−0.54	0.27
Improved	Injury/safety	−0.67	0.29
Deteriorated	Nutritional	−0.76	0.39
Stabilized	Activity	−0.85	0.06
Deteriorated	Cognitive	−0.89	0.27
Stabilized	Fluid volume	−0.99	0.26
Improved	Activity	−1.09	0.00
Stabilized	Cognitive	−1.12	0.01
Deteriorated	Coping	−1.57	0.28
	R^2		0.73
	mean		11.56
	intercept		8.39

Table 9.12

Regression results as predictors of nursing visits, by total episode: Nursing diagnosis home health care components discharge statuses

All provider visits

Type	Variable	Coefficient	P value
Deteriorated	Physical regulation	9.85	0.00
Deteriorated	Metabolic	9.64	0.00
Deteriorated	Tissue integrity	8.88	0.00
Deteriorated	Medication	7.52	0.06
Deteriorated	Role relationship	7.42	0.07
Stabilized	Medication	7.36	0.00
Improved	Role relationship	7.26	0.00
Improved	Metabolic	7.09	0.00
Stabilized	Metabolic	5.87	0.00
Improved	Tissue integrity	5.67	0.00
Deteriorated	Tissue perfusion	5.40	0.00
Stabilized	Self-care	4.75	0.00
Deteriorated	Self-care	4.60	0.00
Stabilized	Urinary elimination	4.59	0.00
Improved	Self-care	4.14	0.00
Stabilized	Physical regulation	3.79	0.01
Improved	Activity	3.42	0.00
Deteriorated	Sensory	3.14	0.03
Improved	Physical regulation	2.47	0.01
Improved	Urinary elimination	2.16	0.00
Improved	Coping	2.02	0.09
Deteriorated	Health behavior	1.99	0.35
Deteriorated	Activity	1.90	0.07
Improved	Fluid volume	1.87	0.03
Stabilized	Injury/safety	1.87	0.15
Deteriorated	Urinary elimination	1.85	0.22
Stabilized	Tissue integrity	1.64	0.07
Improved	Tissue perfusion	1.62	0.03
Stabilized	Digestive	1.46	0.11
Improved	Sensory	1.32	0.06
Improved	Health behavior	1.16	0.14
Stabilized	Tissue perfusion	1.13	0.18
Improved	Cognitive	0.91	0.04
Stabilized	Health behavior	0.84	0.52
Improved	Digestive	0.80	0.21
Stabilized	Coping	0.69	0.69
Stabilized	Cardiac output	0.62	0.37
Stabilized	Activity	0.29	0.68
Stabilized	Sensory	0.11	0.91
Improved	Cardiac output	0.09	0.90
Improved	Self-concept	0.07	0.96

Table 9.12 (cont.)

Regression results as predictors of nursing visits, by total episode: Nursing diagnosis home health care components discharge statuses

	All provider visits		
Type	Variable	Coefficient	P value
Deteriorated	Nutritional	0.00	1.00
Deteriorated	Fluid volume	−0.07	0.96
Stabilized	Nutritional	−0.09	0.94
Stabilized	Role relationship	−0.19	0.91
Improved	Respiratory	−0.24	0.74
Deteriorated	Cardiac output	−0.54	0.65
Stabilized	Self-concept	−0.57	0.76
Deteriorated	Injury/safety	−0.57	0.63
Deteriorated	Respiratory	−0.91	0.42
Deteriorated	Digestive	−0.94	0.54
Deteriorated	Cognitive	−0.96	0.43
Deteriorated	Self-concept	−1.06	0.74
Stabilized	Respiratory	−1.18	0.16
Improved	Injury/safety	−1.23	0.20
Improved	Medication	−1.33	0.25
Stabilized	Cognitive	−1.79	0.01
Improved	Nutritional	−2.07	0.01
Stabilized	Fluid volume	−2.32	0.08
Deteriorated	Coping	−3.38	0.12
	R^2		0.081
	mean		17.99
	intercept		11.60

Table 9.13
Regression results as predictors of nursing and all provider visits, by first thirty days and total episode: Nursing intervention home health care components

First thirty days of episodes

Nursing visits				All provider visits			
Rank	Variable	Coefficient	P value	Rank	Variable	Coefficient	P value
1	Wound care	3.48	0.00	1	Wound care	3.14	0.00
2	Metabolic	1.55	0.00	2	Metabolic	1.24	0.00
3	Physical regulation	0.73	0.00	3	Skilled observation	1.01	0.00
4	Fluid volume	0.54	0.00	4	Urinary elimination	0.95	0.00
5	Respiratory	0.34	0.05	5	Tissue integrity	0.93	0.00
6	Digestive	0.30	0.03	6	Digestive	0.74	0.00
7	Self-concept	0.29	0.23	7	Cognitive	0.74	0.03
8	Skilled observation	0.24	0.05	8	Physical regulation	0.73	0.00
9	Tissue perfusion	0.22	0.11	9	Health behavior	0.72	0.00
10	Medication	0.19	0.15	10	Self-care	0.50	0.06
11	Tissue integrity	0.18	0.19	11	Fluid volume	0.24	0.28
12	Urinary elimination	0.12	0.43	12	Medication	0.20	0.30
13	Sensory	0.01	0.97	13	Respiratory	0.19	0.45
14	Coping	-0.01	0.98	14	Injury/safety	0.16	0.48
15	Cardiac output	-0.02	0.86	15	Tissue perfusion	0.08	0.71
16	Nutritional	-0.05	0.70	16	Sensory	0.07	0.75
17	Self-care	-0.11	0.53	17	Cardiac output	-0.01	0.95
18	Health behavior	-0.17	0.19	18	Self-concept	-0.06	0.88
19	Injury/safety	-0.26	0.09	19	Role relationship	-0.20	0.63
20	Activity	-0.27	0.06	20	Activity	-0.38	0.07
21	Role relationship	-0.38	0.20	21	Nutritional	-0.44	0.02
22	Cognitive	-0.43	0.06	22	Coping	-0.63	0.05
R^2		0.105		R^2		0.061	
mean		7.519		mean		11.032	
intercept		5.398		intercept		7.905	

Total episode

Nursing visits				All provider visits			
Rank	Variable	Coefficient	P value	Rank	Variable	Coefficient	P value
1	Wound care	5.97	0.00	1	Wound care	5.07	0.00
2	Metabolic	3.95	0.00	2	Urinary elimination	4.74	0.00
3	Physical regulation	2.57	0.00	3	Metabolic	4.38	0.00
4	Urinary elimination	1.69	0.00	4	Physical regulation	3.66	0.00
5	Tissue integrity	1.49	0.00	5	Tissue integrity	3.52	0.00
6	Coping	0.69	0.18	6	Skilled observation	2.16	0.00
7	Sensory	0.62	0.10	7	Health behavior	1.35	0.00
8	Respiratory	0.60	0.14	8	Self-care	1.16	0.07
9	Skilled observation	0.57	0.04	9	Digestive	1.07	0.03
10	Digestive	0.51	0.11	10	Sensory	0.51	0.38
11	Medication	0.47	0.13	11	Injury/safety	0.51	0.34
12	Fluid volume	0.22	0.53	12	Respiratory	0.37	0.55
13	Cardiac output	0.03	0.91	13	Cognitive	0.35	0.67
14	Tissue perfusion	-0.08	0.81	14	Medication	0.31	0.52
15	Nutritional	-0.08	0.80	15	Cardiac output	-0.06	0.90
16	Self-care	-0.13	0.76	16	Tissue perfusion	-0.44	0.37
17	Injury/safety	-0.22	0.53	17	Coping	-0.45	0.57
18	Health behavior	-0.29	0.33	18	Nutritional	-0.64	0.18
19	Self-concept	-0.57	0.32	19	Fluid volume	-0.81	0.14
20	Activity	-0.77	0.02	20	Activity	-1.32	0.01
21	Cognitive	-1.14	0.03	21	Self-concept	-1.35	0.13
22	Role relationship	-1.52	0.03	22	Role relationship	-2.11	0.04
R^2		0.085		R^2		0.062	
mean		11.525		mean		17.947	
intercept		6.288		intercept		10.024	

Table 9.14

Mean results of nursing and all provider, by first thirty days: Number of nursing intervention (RN Rx) home health care components

Nursing visits				All provider visits			
RN Rx		Mean	SD	RN Rx		Mean	SD
0	26	2.31	2.46	0	26	10.03	8.51
1	473	5.03	3.67	1	473	8.72	6.27
2	822	7.41	6.76	2	822	10.20	8.18
3	934	7.27	6.17	3	934	10.33	8.15
4	900	7.27	5.66	4	900	10.37	7.73
5	968	7.21	5.47	5	968	10.23	7.47
6	899	7.89	5.72	6	898	11.24	7.85
7	857	7.62	5.43	7	856	10.88	7.91
8	706	7.97	5.73	8	706	11.70	8.10
9	596	8.21	5.61	9	595	12.28	8.34
10	446	8.11	5.47	10	446	12.28	8.42
11	334	8.28	4.99	11	334	12.53	8.16
12	236	8.17	4.99	12	236	13.05	8.01
13	160	8.36	5.41	13	160	14.16	8.89
14	111	8.26	4.72	14	111	13.10	8.64
15	42	8.52	4.01	15	42	12.99	9.21
16	24	9.83	8.06	16	24	18.72	15.98
17	15	7.87	4.75	17	15	9.21	5.93
18	4	9.75	3.86	18	4	24.79	8.61
19	1	21.00	0.00	19	1	24.35	0.00
R^2		0.020		R^2		0.023	
mean		7.52		mean		11.03	
n		8551		n		8551	

Table 9.15

Mean results of nursing and all provider, by total episode: Number of nursing intervention (RN Rx) home health care components

Nursing visits				All provider visits			
RN Rx		Mean	SD	RN Rx		Mean	SD
0	26	3.65	3.77	0	26	15.73	17.89
1	473	6.71	6.98	1	473	12.79	14.03
2	822	10.71	12.77	2	822	15.58	17.53
3	934	10.76	13.25	3	934	16.03	18.24
4	900	10.54	10.87	4	900	16.28	17.69
5	968	10.49	10.92	5	968	15.90	16.73
6	899	12.01	11.65	6	899	18.19	18.68
7	857	11.43	12.24	7	857	17.30	18.88
8	706	12.66	14.19	8	706	19.47	20.64
9	596	13.39	16.40	9	596	21.25	23.25
10	446	13.76	17.74	10	446	22.18	26.14
11	334	13.43	15.48	11	334	21.92	25.06
12	236	14.31	14.16	12	236	23.22	22.65
13	160	14.83	15.83	13	160	25.00	24.54
14	111	14.95	13.80	14	111	26.09	29.45
15	42	14.45	11.26	15	42	22.32	19.87
16	24	13.17	9.42	16	24	25.67	23.39
17	15	16.07	18.82	17	15	19.66	22.55
18	4	15.00	4.24	18	4	37.98	9.40
19	1	59.00	0.00	19	1	62.35	0.00
R^2		0.021		R^2		0.023	
mean		11.53		mean		19.95	
n		8554		n		8554	

Table 9.18

Mean results of nursing and all provider visits, by first thirty days and total episode: Nursing intervention type patterns*

			First thirty days				
	Nursing visits				All provider visits		
Type RN Rx Pattern	N	Mean	SD	Type RN Rx Pattern	N	Mean	SD
A	302	4.78	3.27	A	302	8.58	6.60
A/C	775	7.95	7.21	A/C	775	10.94	8.73
A/M	87	4.33	3.49	A/M	87	10.44	6.82
A/T	1103	5.67	3.28	A/T	1103	8.60	8.24
A/M/T	380	5.75	3.28	A/M/T	380	9.56	6.52
A/C/M	118	8.91	7.91	A/C/M	118	12.94	9.21
A/C/T	2980	8.13	5.98	A/C/T	2980	11.32	8.12
A/C/M/T	1342	8.22	5.75	A/C/M/T	1342	12.92	8.69
C	73	7.79	5.95	C	73	10.40	8.07
C/T	974	8.15	5.93	C/T	974	11.36	8.28
C/M	84	8.89	4.11	C/M	84	11.02	6.52
C/M/T	307	7.84	5.13	C/M/T	307	11.83	7.99
	R^2		0.039		R^2		0.027
	mean		7.53		mean		11.04
	n		8525		n		8525

			Total episode				
	Nursing visits				All provider visits		
Type RN Rx Pattern	N	Mean	SD	Type RN Rx Pattern	N	Mean	SD
A	302	5.92	4.81	A	302	11.77	12.40
A/C	775	12.42	14.84	A/C	775	18.08	20.08
A/M	87	6.02	8.19	A/M	87	16.24	14.20
A/T	1104	7.05	5.45	A/T	1104	11.53	11.92
A/M/T	380	7.55	5.43	A/M/T	380	13.58	12.38
A/C/M	118	15.60	18.49	A/C/M	118	25.15	28.04
A/C/T	2981	12.97	14.02	A/C/T	2981	19.30	21.56
A/C/M/T	1343	13.44	15.19	A/C/M/T	1343	22.26	23.18
C	73	13.89	14.19	C	73	18.31	17.15
C/T	974	12.37	14.15	C/T	974	18.08	19.32
C/M	84	9.08	5.90	C/M	84	16.50	17.35
C/M/T	307	11.43	10.72	C/M/T	307	17.97	16.81
	R^2		0.038		R^2		0.030
	mean		11.55		mean		17.95
	n		8528		n		8528

*A = Assess, C = Care, M = Manage, T = Teach

Table 9.17

Regression results as predictors of nursing visits, by first thirty days:
Nursing intervention home health care components type

Type	Variable	Nursing visits Coefficient	P value
Manage	Wound care	11.95	0.00
Manage	Skilled observation	10.95	0.04
Manage	Fluid volume	4.26	0.42
Care	Wound care	3.89	0.00
Manage	Role relationship	3.85	0.30
Care	Fluid volume	2.80	0.00
Manage	Injury/safety	1.95	0.47
Manage	Urinary elimination	1.93	0.61
Care	Metabolic	1.74	0.00
Care	Medication	1.19	0.00
Teach	Nutritional	1.18	0.17
Care	Physical regulation	0.99	0.00
Care	Self-concept	0.99	0.41
Manage	Physical regulation	0.97	0.22
Teach	Metabolic	0.95	0.00
Care	Tissue integrity	0.93	0.00
Teach	Skilled observation	0.78	0.50
Teach	Respiratory	0.71	0.01
Care	Activity	0.70	0.41
Teach	Wound care	0.53	0.02
Assess	Wound care	0.51	0.01
Assess	Self-concept	0.48	0.07
Teach	Tissue perfusion	0.47	0.00
Care	Health behavior	0.43	0.34
Assess	Physical regulation	0.43	0.00
Teach	Cognitive	0.41	0.45
Care	Role relationship	0.41	0.72
Assess	Skilled observation	0.38	0.07
Care	Sensory	0.33	0.67
Assess	Fluid volume	0.32	0.12
Manage	Digestive	0.31	0.93
Care	Digestive	0.29	0.10
Assess	Metabolic	0.27	0.29
Assess	Urinary elimination	0.27	0.20
Manage	Metabolic	0.26	0.93
Care	Urinary elimination	0.22	0.36
Teach	Medication	0.21	0.11
Care	Nutritional	0.19	0.77
Teach	Tissue integrity	0.14	0.46
Care	Injury/safety	0.13	0.90
Teach	Injury/safety	0.09	0.70
Assess	Health behavior	0.09	0.62
Teach	Digestive	0.08	0.75
Assess	Role relationship	0.07	0.70
Teach	Fluid volume	0.04	0.81
Assess	Medication	0.04	0.79
Assess	Cardiac output	0.04	0.78
Manage	Health behavior	0.02	0.93

Table 9.17 (cont.)

Regression results as predictors of nursing visits, by first thirty days:
Nursing intervention home health care components type

		Nursing visits	
Type	Variable	Coefficient	P value
Teach	Cardiac output	0.02	0.92
Teach	Role relationship	0.02	0.91
Assess	Injury/safety	0.01	0.95
Teach	Self-care	0.00	0.00
Manage	Sensory	0.00	0.00
Manage	Self-care	0.00	0.00
Manage	Nutritional	0.00	0.00
Manage	Cognitive	0.00	0.00
Care	Self-care	0.00	0.00
Assess	Self-care	0.00	0.00
Teach	Health behavior	−0.01	0.95
Teach	Activity	−0.03	0.87
Teach	Physical regulation	−0.05	0.75
Care	Coping	−0.07	0.82
Teach	Coping	−0.08	0.80
Manage	Coping	−0.10	0.93
Assess	Digestive	−0.10	0.58
Assess	Tissue perfusion	−0.14	0.47
Assess	Coping	−0.20	0.64
Assess	Tissue integrity	−0.20	0.20
Assess	Activity	−0.21	0.31
Teach	Urinary elimination	−0.23	0.29
Care	Cardiac output	−0.38	0.87
Assess	Respiratory	−0.40	0.41
Teach	Self-concept	−0.41	0.48
Assess	Sensory	−0.48	0.79
Assess	Cognitive	−0.53	0.03
Assess	Nutritional	−0.75	0.43
Manage	Medication	−0.92	0.48
Teach	Sensory	−1.00	0.37
Manage	Cardiac output	−1.09	0.62
Manage	Self-concept	−1.41	0.79
Care	Respiratory	−1.50	0.04
Care	Tissue perfusion	−1.66	0.01
Manage	Tissue integrity	−1.66	0.62
Care	Cognitive	−1.98	0.62
Manage	Respiratory	−2.17	0.68
Manage	Tissue perfusion	−2.25	0.24
Care	Skilled observation	−2.73	0.47
Manage	Activity	−3.65	0.50
	R^2		0.146
	mean		7.53
	intercept		5.16

Table 9.18

Regression results as predictors of nursing visits, by first thirty days:
Nursing intervention home health care components type

All provider visits

Type	Variable	Coefficient	P value
Manage	Wound care	14.84	0.01
Manage	Skilled observation	8.32	0.28
Care	Wound care	3.33	0.00
Manage	Urinary elimination	3.27	0.55
Manage	Injury/safety	2.93	0.46
Teach	Cognitive	2.57	0.00
Manage	Metabolic	2.02	0.65
Care	Tissue integrity	1.80	0.00
Care	Activity	1.60	0.21
Care	Fluid volume	1.51	0.01
Manage	Coping	1.49	0.37
Care	Digestive	1.40	0.00
Care	Physical regulation	1.39	0.00
Assess	Urinary elimination	0.98	0.00
Teach	Metabolic	0.97	0.00
Teach	Tissue integrity	0.95	0.00
Care	Medication	0.93	0.01
Manage	Role relationship	0.92	0.87
Teach	Skilled observation	0.91	0.59
Assess	Wound care	0.90	0.00
Care	Metabolic	0.82	0.05
Teach	Nutritional	0.76	0.55
Teach	Injury/safety	0.75	0.03
Care	Role relationship	0.74	0.65
Manage	Physical regulation	0.67	0.57
Teach	Tissue perfusion	0.61	0.00
Care	Health behavior	0.54	0.41
Assess	Self-concept	0.50	0.19
Assess	Fluid volume	0.47	0.12
Assess	Cognitive	0.44	0.21
Teach	Wound care	0.30	0.38
Assess	Physical regulation	0.30	0.15
Care	Urinary elimination	0.29	0.40
Assess	Health behavior	0.29	0.27
Care	Nutritional	0.27	0.78
Teach	Digestive	0.26	0.44
Teach	Physical regulation	0.22	0.33
Teach	Medication	0.19	0.31
Manage	Health behavior	0.17	0.64
Assess	Skilled observation	0.16	0.60
Assess	Cardiac output	0.18	0.45
Care	Injury/safety	0.08	0.98
Teach	Urinary elimination	0.07	0.83
Teach	Respiratory	0.08	0.88
Assess	Medication	0.01	0.96
Teach	Self-care	0.00	0.00
Manage	Sensory	0.00	0.00

Table 9.18 (cont.)

Regression results as predictors of nursing visits, by first thirty days:
Nursing intervention home health care components type

	All provider visits		
Type	Variable	Coefficient	P value
Manage	Self-care	0.00	0.00
Manage	Nutritional	0.00	0.00
Manage	Cognitive	0.00	0.00
Care	Self-care	0.00	0.00
Assess	Self-care	0.00	0.00
Assess	Metabolic	-0.02	0.97
Assess	Digestive	-0.03	0.91
Assess	Activity	-0.06	0.84
Assess	Tissue integrity	-0.10	0.67
Assess	Injury/safety	-0.12	0.67
Assess	Role relationship	-0.13	0.65
Teach	Cardiac output	-0.14	0.61
Assess	Tissue perfusion	-0.19	0.49
Teach	Role relationship	-0.20	0.31
Teach	Fluid volume	-0.21	0.43
Care	Coping	-0.23	0.60
Care	Self-concept	-0.24	0.89
Teach	Health behavior	-0.29	0.32
Care	Sensory	-0.34	0.77
Manage	Fluid volume	-0.38	0.96
Teach	Activity	-0.41	0.12
Teach	Coping	-0.55	0.25
Teach	Self-concept	-0.59	0.50
Manage	Cardiac output	-0.65	0.84
Assess	Coping	-0.70	0.27
Teach	Sensory	-0.89	0.59
Manage	Tissue integrity	-1.02	0.84
Assess	Respiratory	-1.04	0.15
Manage	Medication	-1.27	0.50
Assess	Nutritional	-1.36	0.32
Care	Tissue perfusion	-1.84	0.06
Care	Respiratory	-1.97	0.06
Assess	Sensory	-2.18	0.41
Care	Cardiac output	-2.64	0.43
Care	Skilled observation	-3.32	0.55
Manage	Tissue perfusion	-3.42	0.22
Manage	Digestive	-3.52	0.52
Care	Cognitive	-3.84	0.51
Manage	Respiratory	-3.84	0.62
Manage	Self-concept	-4.75	0.54
Manage	Activity	-5.68	0.48
	R^2		0.081
	mean		11.04
	intercept		8.35

Table 9.19

Regression results as predictors of nursing visits, by total episode: Nursing intervention home health care components type

Type	Variable	Nursing visits	
		Coefficient	P value
Manage	Wound care	27.45	0.00
Manage	Fluid volume	20.20	0.10
Manage	Injury/safety	14.20	0.02
Manage	Skilled observation	7.82	0.52
Care	Wound care	6.94	0.00
Care	Fluid volume	6.18	0.00
Manage	Tissue integrity	5.97	0.44
Manage	Physical regulation	5.14	0.00
Care	Tissue integrity	4.60	0.00
Care	Physical regulation	4.27	0.00
Care	Medication	4.21	0.00
Manage	Metabolic	4.02	0.57
Care	Nutritional	3.53	0.02
Teach	Nutritional	2.95	0.14
Teach	Metabolic	2.57	0.00
Care	Urinary elimination	2.45	0.00
Teach	Sensory	2.41	0.35
Care	Self-concept	2.33	0.40
Care	Sensory	2.31	0.21
Assess	Metabolic	2.06	0.00
Assess	Wound care	1.76	0.00
Care	Metabolic	1.75	0.01
Teach	Respiratory	1.73	0.01
Assess	Skilled observation	1.64	0.00
Manage	Urinary elimination	1.58	0.86
Care	Activity	1.50	0.45
Care	Role relationship	1.41	0.59
Care	Health behavior	1.08	0.30
Care	Digestive	0.90	0.03
Care	Coping	0.89	0.20
Assess	Injury/safety	0.82	0.06
Assess	Physical regulation	0.81	0.01
Manage	Role relationship	0.81	0.93
Teach	Cardiac output	0.80	0.07
Assess	Urinary elimination	0.76	0.11
Care	Tissue perfusion	0.65	0.67
Manage	Health behavior	0.62	0.27
Teach	Tissue integrity	0.58	0.17
Teach	Digestive	0.44	0.42
Teach	Medication	0.43	0.15
Manage	Digestive	0.43	0.96
Teach	Injury/safety	0.41	0.46
Assess	Cardiac output	0.38	0.25
Assess	Fluid volume	0.31	0.52
Teach	Tissue perfusion	0.30	0.37
Assess	Role relationship	0.30	0.19
Assess	Medication	0.28	0.41
Assess	Health behavior	0.28	0.50

Table 9.19 (cont.)

Regression results as predictors of nursing visits, by total episode: Nursing intervention home health care components type

Type	Variable	Nursing visits	
		Coefficient	P value
Assess	Tissue perfusion	0.18	0.69
Teach	Wound care	0.16	0.77
Teach	Role relationship	0.15	0.63
Teach	Cognitive	0.14	0.91
Care	Injury/safety	0.08	0.97
Manage	Medication	0.01	1.00
Teach	Self-care	0.00	0.00
Manage	Sensory	0.00	0.00
Manage	Self-care	0.00	0.00
Manage	Nutritional	0.00	0.00
Manage	Cognitive	0.00	0.00
Care	Self-care	0.00	0.00
Assess	Self-care	0.00	0.00
Teach	Health behavior	-0.01	0.98
Assess	Tissue integrity	-0.08	0.82
Teach	Physical regulation	-0.13	0.71
Assess	Self-concept	-0.20	0.74
Teach	Self-concept	-0.22	0.87
Assess	Coping	-0.26	0.79
Teach	Activity	-0.31	0.46
Teach	Skilled observation	-0.34	0.90
Teach	Coping	-0.36	0.64
Teach	Urinary elimination	-0.38	0.46
Assess	Activity	-0.40	0.40
Assess	Digestive	-0.53	0.22
Assess	Respiratory	-0.74	0.52
Teach	Fluid volume	-0.78	0.06
Assess	Cognitive	-1.13	0.04
Care	Skilled observation	-1.62	0.85
Care	Cardiac output	-1.87	0.72
Assess	Nutritional	-1.92	0.38
Care	Cognitive	-1.92	0.83
Care	Respiratory	-2.09	0.21
Assess	Sensory	-2.19	0.60
Manage	Coping	-2.54	0.33
Manage	Self-concept	-2.60	0.83
Manage	Cardiac output	-3.59	0.47
Manage	Activity	-5.65	0.65
Manage	Respiratory	-7.44	0.54
Manage	Tissue perfusion	-7.59	0.08
	R^2		0.143
	mean		11.55
	intercept		5.25

Table 9.20

Regression results as predictors of nursing visits, by total episode: Nursing intervention home health care components type

		All provider visits	
Type	Variable	Coefficient	P value
Manage	Wound care	37.86	0.01
Manage	Injury/safety	24.66	0.01
Care	Skilled observation	15.27	0.26
Manage	Tissue integrity	9.10	0.45
Care	Tissue integrity	7.69	0.00
Manage	Fluid volume	7.57	0.69
Care	Physical regulation	7.09	0.00
Care	Wound care	6.08	0.00
Manage	Physical regulation	5.70	0.04
Care	Nutritional	5.30	0.02
Care	Medication	5.05	0.00
Care	Urinary elimination	5.00	0.00
Manage	Skilled observation	4.22	0.82
Care	Fluid volume	4.03	0.00
Care	Tissue perfusion	3.91	0.10
Manage	Coping	3.89	0.34
Care	Role relationship	3.87	0.33
Teach	Cognitive	3.84	0.05
Manage	Medication	3.82	0.41
Teach	Nutritional	3.70	0.23
Teach	Metabolic	3.05	0.00
Manage	Metabolic	3.05	0.78
Teach	Sensory	2.90	0.47
Manage	Urinary elimination	2.76	0.84
Care	Self-conceptSelf-conceptSelf-c	2.61	0.54
Care	Activity	2.55	0.41
Care	Digestive	2.44	0.00
Assess	Metabolic	2.33	0.01
Assess	Urinary elimination	2.19	0.00
Teach	Tissue integrity	2.18	0.00
Assess	Wound care	2.14	0.00
Assess	Skilled observation	2.04	0.01
Care	Sensory	1.97	0.49
Assess	Injury/safety	0.94	0.17
Assess	Cardiac output	0.89	0.08
Teach	Injury/safety	0.86	0.31
Care	Coping	0.80	0.46
Assess	Physical regulation	0.79	0.11
Teach	Respiratory	0.77	0.45
Assess	Health behavior	0.76	0.23
Manage	Health behavior	0.66	0.44
Teach	Digestive	0.66	0.44
Teach	Urinary elimination	0.51	0.52
Assess	Tissue perfusion	0.50	0.46
Care	Metabolic	0.44	0.66
Teach	Physical regulation	0.41	0.45
Assess	Role relationship	0.38	0.57
Teach	Tissue perfusion	0.33	0.53

Table 9.20 (cont.)

Regression results as predictors of nursing visits, by total episode: Nursing intervention home health care components type

		All provider visits	
Type	Variable	Coefficient	P value
Teach	Medication	0.32	0.49
Assess	Tissue integrity	0.29	0.61
Assess	Fluid volume	0.28	0.71
Assess	Medication	0.24	0.67
Care	Health behavior	0.18	0.91
Teach	Cardiac output	0.16	0.82
Assess	Cognitive	0.09	0.91
Teach	Self-care	0.00	0.00
Manage	Sensory	0.00	0.00
Manage	Self-care	0.00	0.00
Manage	Nutritional	0.00	0.00
Manage	Cognitive	0.00	0.00
Care	Self-care	0.00	0.00
Assess	Self-care	0.00	0.00
Teach	Role relationship	-0.04	0.93
Teach	Wound care	-0.09	0.91
Teach	Self-concept	-0.14	0.95
Teach	Health behavior	-0.19	0.79
Assess	Activity	-0.24	0.74
Assess	Self-concept	-0.50	0.60
Assess	Digestive	-0.50	0.46
Teach	Activity	-1.06	0.11
Care	Injury/safety	-1.27	0.73
Assess	Coping	-1.31	0.39
Teach	Fluid volume	-1.71	0.01
Teach	Coping	-1.85	0.11
Care	Respiratory	-1.89	0.47
Teach	Skilled observation	-2.81	0.49
Assess	Respiratory	-3.25	0.07
Assess	Nutritional	-3.71	0.27
Manage	Digestive	-4.26	0.75
Assess	Sensory	-4.73	0.47
Care	Cardiac output	-4.97	0.54
Manage	Cardiac output	-5.20	0.50
Manage	Role relationship	-5.41	0.69
Manage	Self-concept	-7.07	0.71
Care	Cognitive	-7.08	0.62
Manage	Activity	-10.27	0.60
Manage	Respiratory	-10.45	0.58
Manage	Tissue perfusion	-11.04	0.10
	R^2		0.109
	mean		17.95
	intercept		9.70

Table 9.21
Mean nursing and all provider visits, by first thirty days and total episode: Medical diagnoses or surgical procedures

First thirty days of episode

Nursing visits

Med Dx/Rx	N	Mean	SD
OP Nervous	111	8.07	5.74
OP Eye	91	7.74	5.82
OP Respiratory	131	6.76	4.00
OP Cardiovascular	448	8.77	6.28
OP Digestive	615	9.33	7.55
OP Urinary	129	7.93	5.25
OP Musculoskeletal	665	7.11	6.06
OP Integumentary	197	12.31	9.53
Infectious	165	8.25	7.81
Neoplasms	425	6.50	4.26
Endocrine	520	8.04	5.50
Nervous System	230	6.01	4.09
Circulatory	1892	6.92	4.20
Respiratory	589	6.74	3.83
Digestive	248	6.52	5.20
Genitourinary	177	6.46	4.52
Skin	254	10.80	8.06
Musculoskeletal	181	5.92	4.54
Symptoms, Signs	332	6.40	4.81
Injury, Poison	554	7.65	5.91
R^2		0.053	
mean		7.545	
n		7954	

All provider visits

Med Dx/Rx	N	Mean	SD
OP Nervous	111	12.95	8.63
OP Eye	91	10.82	8.57
OP Respiratory	131	9.54	7.58
OP Cardiovascular	448	11.84	8.68
OP Digestive	615	11.49	8.69
OP Urinary	129	10.80	7.53
OP Musculoskeletal	665	14.13	8.63
OP Integumentary	197	14.59	11.15
Infectious	165	11.69	9.41
Neoplasms	425	9.27	6.44
Endocrine	520	9.93	6.85
Nervous System	230	10.05	7.18
Circulatory	1892	10.88	8.05
Respiratory	589	9.04	5.92
Digestive	248	8.54	6.98
Genitourinary	177	9.53	7.21
Skin	254	13.12	8.99
Musculoskeletal	181	10.93	7.29
Symptoms, Signs	332	10.43	7.72
Injury, Poison	554	12.71	8.08
R^2		0.037	
mean		11.136	
n		7954	

Total episode

Nursing visits

Med Dx/Rx	N	Mean	SD
OP Nervous	111	11.91	11.56
OP Eye	91	11.13	12.42
OP Respiratory	131	10.98	12.08
OP Cardiovascular	448	12.39	11.54
OP Digestive	615	13.28	14.92
OP Urinary	129	13.33	15.79
OP Musculoskeletal	665	11.21	13.44
OP Integumentary	197	19.22	21.27
Infectious	165	12.11	14.10
Neoplasms	425	10.73	10.80
Endocrine	520	11.96	11.25
Nervous System	230	10.08	18.04
Circulatory	1893	10.54	11.25
Respiratory	589	9.72	7.63
Digestive	248	9.69	10.47
Genitourinary	177	10.07	9.83
Skin	254	21.04	24.65
Musculoskeletal	181	10.26	15.30
Symptoms, Signs	332	9.77	9.04
Injury, Poison	555	11.28	12.98
R^2		0.032	
mean		11.580	
n		7956	

All provider visits

Med Dx/Rx	N	Mean	SD
OP Nervous	111	19.58	18.03
OP Eye	91	17.13	22.15
OP Respiratory	131	16.11	17.78
OP Cardiovascular	448	17.44	17.13
OP Digestive	615	16.78	17.88
OP Urinary	129	19.04	23.51
OP Musculoskeletal	665	23.60	21.67
OP Integumentary	197	24.06	27.87
Infectious	165	18.20	19.33
Neoplasms	425	15.74	16.28
Endocrine	520	15.79	16.55
Nervous System	230	17.41	23.39
Circulatory	1893	17.81	20.45
Respiratory	589	14.13	14.43
Digestive	248	14.12	18.04
Genitourinary	177	17.25	21.13
Skin	254	27.08	30.79
Musculoskeletal	181	18.83	23.32
Symptoms, Signs	332	17.71	17.52
Injury, Poison	555	19.32	18.54
R^2		0.022	
mean		18.131	
n		7956	

Table 9.22

Regression results as predictors of nursing and all provider visits, by first thirty days: Nursing diagnosis (RN Dx) home health care components and demographic (Demo) variables

Nursing visits					All provider visits				
Rank	Type	Variable	Coefficient	P value	Rank	Type	Variable	Coefficient	P value
1	RN Dx	Tissue integrity	2.70	0.00	1	RN Dx	Tissue integrity	2.71	0.00
2	RN Dx	Physical regulation	1.19	0.00	2	RN Dx	Self-care	2.16	0.00
3	RN Dx	Metabolic	1.09	0.00	3	RN Dx	Role relationship	1.84	0.00
4	Demo	Careself	0.85	0.00	4	RN Dx	Activity	1.63	0.00
5	Demo	Petshome	0.61	0.00	5	RN Dx	Metabolic	1.26	0.00
6	Demo	Comprehends	0.60	0.00	6	RN Dx	Physical regulation	0.94	0.00
7	Demo	Married	0.50	0.00	7	Demo	Married	0.74	0.00
8	RN Dx	Fluid volume	0.50	0.01	8	Demo	Petshome	0.68	0.02
9	RN Dx	Coping	0.47	0.06	9	Demo	Comprehends	0.63	0.00
10	RN Dx	Cognitive	0.44	0.00	10	RN Dx	Health behavior	0.63	0.02
11	RN Dx	Self-concept	0.30	0.28	11	RN Dx	Cognitive	0.59	0.00
12	RN Dx	Digestive	0.24	0.10	12	RN Dx	Coping	0.53	0.14
13	RN Dx	Health behavior	0.22	0.24	13	RN Dx	Careself	0.49	0.03
14	RN Dx	Medication	0.21	0.43	14	RN Dx	Sensory	0.46	0.04
15	Demo	Alone	0.16	0.37	15	RN Dx	Fluid volume	0.31	0.25
16	RN Dx	Respiratory	0.08	0.56	16	RN Dx	Medication	0.19	0.62
17	RN Dx	Tissue perfusion	0.06	0.71	17	RN Dx	Tissue perfusion	0.16	0.46
18	RN Dx	Sensory	0.04	0.80	18	RN Dx	Digestive	0.11	0.62
19	RN Dx	Cardiac output	0.03	0.82	19	RN Dx	Urinary elimination	0.02	0.93
20	RN Dx	Self-care	−0.01	0.95	20	Demo	House	0.01	0.95
21	Demo	Age	−0.03	0.00	21	Demo	Age	−0.02	0.06
22	RN Dx	Role relationship	−0.05	0.86	22	RN Dx	Self-concept	−0.05	0.90
23	Demo	Male	−0.13	0.33	23	RN Dx	Cardiac output	−0.14	0.48
24	Demo	White	−0.13	0.37	24	Demo	Alone	−0.19	0.44
25	Demo	House	−0.14	0.32	25	RN Dx	Respiratory	−0.33	0.11
26	RN Dx	Urinary elimination	−0.31	0.05	26	Demo	Communicates	−0.45	0.07
27	RN Dx	Nutritional	−0.36	0.03	27	Demo	Male	−0.47	0.01
28	RN Dx	Injury/safety	−0.46	0.03	28	RN Dx	Injury/safety	−0.52	0.08
29	RN Dx	Activity	−0.59	0.00	29	Demo	White	−0.57	0.01
30	Demo	Communicates	−0.95	0.00	30	RN Dx	Nutritional	−0.94	0.00
		R^2	0.080				R^2	0.074	
		mean	7.51				mean	11.03	
		intercept	8.48				intercept	9.49	

Table 9.23

Regression results as predictors of nursing and all provider visits, by total episode: Nursing diagnosis (RN Dx) home health care components and demographic (Demo) variables

Nursing visits					All provider visits				
Rank	**Type**	**Variable**	**Coefficient**	**P value**	**Rank**	**Type**	**Variable**	**Coefficient**	**P value**
1	RN Dx	Tissue integrity	5.15	0.00	1	RN Dx	Metabolic	6.37	0.00
2	RN Dx	Metabolic	4.14	0.00	2	RN Dx	Tissue integrity	5.50	0.00
3	RN Dx	Physical regulation	2.89	0.00	3	RN Dx	Self-care	4.62	0.00
4	Demo	Petshome	1.54	0.00	4	RN Dx	Role relationship	3.57	0.00
5	RN Dx	Coping	1.07	0.07	5	RN Dx	Physical regulation	3.50	0.00
6	Demo	Careself	1.01	0.01	6	RN Dx	Activity	2.90	0.00
7	RN Dx	Tissue perfusion	0.99	0.00	7	RN Dx	Urinary elimination	2.48	0.00
8	RN Dx	Sensory	0.97	0.01	8	RN Dx	Tissue perfusion	1.99	0.00
9	RN Dx	Fluid volume	0.97	0.03	9	Demo	Petshome	1.92	0.01
10	RN Dx	Medication	0.91	0.15	10	RN Dx	Sensory	1.81	0.00
11	Demo	Comprehends	0.89	0.01	11	RN Dx	Medication	1.70	0.07
12	RN Dx	Urinary elimination	0.84	0.02	12	Demo	Married	1.50	0.00
13	Demo	Married	0.71	0.04	13	Demo	Comprehends	1.35	0.01
14	Demo	Alone	0.52	0.20	14	RN Dx	Coping	1.08	0.23
15	RN Dx	Digestive	0.50	0.15	15	Demo	House	1.05	0.03
16	RN Dx	Cardiac output	0.42	0.19	16	RN Dx	Health behavior	0.75	0.25
17	RN Dx	Health behavior	0.40	0.35	17	Demo	Careself	0.55	0.34
18	Demo	House	0.39	0.23	18	RN Dx	Digestive	0.54	0.30
19	RN Dx	Cognitive	0.38	0.17	19	RN Dx	Cognitive	0.49	0.24
20	RN Dx	Self-concept	0.36	0.58	20	RN Dx	Fluid volume	0.41	0.54
21	RN Dx	Self-care	0.25	0.46	21	RN Dx	Cardiac output	0.36	0.45
22	RN Dx	Respiratory	0.22	0.51	22	Demo	Communicates	0.14	0.82
23	Demo	Age	-0.05	0.00	23	Demo	Age	-0.04	0.07
24	Demo	White	-0.08	0.82	24	Demo	Alone	-0.19	0.76
25	Demo	Male	-0.17	0.59	25	RN Dx	Respiratory	-0.25	0.63
26	RN Dx	Role relationship	-0.36	0.62	26	RN Dx	Injury/safety	-0.53	0.47
27	RN Dx	Nutritional	-0.42	0.27	27	RN Dx	Self-concept	-0.60	0.54
28	RN Dx	Injury/safety	-0.44	0.36	28	Demo	White	-0.62	0.23
29	RN Dx	Activity	-0.64	0.03	29	Demo	Male	-0.93	0.05
30	Demo	Communicates	-1.15	0.00	30	RN Dx	Nutritional	-1.32	0.02
		R^2	0.066				R^2	0.073	
		mean	11.51				mean	17.93	
		intercept	10.89				intercept	11.34	

Table 9.24

Regression results as predictors of nursing visits, by first thirty days: Nursing intervention (RN Rx) home health care components and demographic (Demo) variables

Rank	Type	Variable	Coefficient	P value
1	RN Rx	Wound care	3.40	0.00
2	RN Rx	Metabolic	1.45	0.00
3	Demo	Careself	0.85	0.00
4	Demo	Petshome	0.77	0.00
5	RN Rx	Physical regulation	0.75	0.00
6	Demo	Comprehends	0.57	0.00
7	RN Rx	Fluid volume	0.57	0.00
8	Demo	Married	0.39	0.01
9	RN Rx	Respiratory	0.34	0.05
10	RN Rx	Digestive	0.29	0.04
11	RN Rx	Tissue integrity	0.28	0.04
12	RN Rx	Tissue perfusion	0.26	0.06
13	RN Rx	Skilled observation	0.25	0.04
14	RN Rx	Urinary elimination	0.24	0.11
15	RN Rx	Self–concept	0.24	0.33
16	RN Rx	Medication	0.12	0.39
17	Demo	Alone	0.09	0.60
18	RN Rx	Coping	0.03	0.88
19	RN Rx	Sensory	0.01	0.93
20	Demo	Age	–0.01	0.02
21	RN Rx	Cardiac output	–0.05	0.72
22	RN Rx	Self–care	–0.05	0.79
23	RN Rx	Nutritional	–0.06	0.64
24	Demo	White	–0.11	0.46
25	Demo	Male	–0.16	0.21
26	RN Rx	Health behavior	–0.20	0.12
27	RN Rx	Injury/safety	–0.24	0.11
28	RN Rx	Activity	–0.28	0.05
29	Demo	House	–0.29	0.03
30	RN Rx	Role relationship	–0.37	0.20
31	RN Rx	Cognitive	–0.42	0.06
32	Demo	Communicates	–0.65	0.00
		R^2	0.114	
		mean	7.51	
		intercept	6.44	

Table 9.27

Regression results as predictors of all provider visits, by total episode: Nursing intervention (RN Rx) home health care components and demographic (Demo) variables

Rank	Type	Variable	Coefficient	P value
1	RN Rx	Wound care	5.13	0.00
2	RN Rx	Urinary elimination	4.48	0.00
3	RN Rx	Metabolic	4.23	0.00
4	RN Rx	Physical regulation	3.57	0.00
5	RN Rx	Tissue integrity	3.35	0.00
6	RN Rx	Skilled observation	2.06	0.00
7	Demo	Petshome	1.95	0.01
8	Demo	Married	1.40	0.01
9	RN Rx	Health behavior	1.30	0.00
10	RN Rx	Self-care	1.04	0.11
11	Demo	Comprehends	1.01	0.06
12	RN Rx	Digestive	0.95	0.05
13	Demo	House	0.80	0.10
14	RN Rx	Sensory	0.78	0.18
15	Demo	Communicates	0.64	0.31
16	RN Rx	Injury/safety	0.56	0.30
17	RN Rx	Respiratory	0.37	0.56
18	Demo	Careself	0.28	0.62
19	RN Rx	Medication	0.24	0.62
20	RN Rx	Cognitive	0.21	0.80
21	Demo	Alone	0.03	0.96
22	RN Rx	Cardiac output	0.02	0.97
23	Demo	Age	−0.02	0.34
24	RN Rx	Tissue perfusion	−0.36	0.46
25	Demo	White	−0.40	0.45
26	RN Rx	Coping	−0.49	0.54
27	RN Rx	Nutritional	−0.70	0.15
28	RN Rx	Fluid volume	−0.85	0.12
29	RN Rx	Activity	−1.15	0.03
30	Demo	Male	−1.30	0.01
31	RN Rx	Self-concept	−1.39	0.12
32	RN Rx	Role relationship	−2.11	0.05
		R^2	0.066	
		mean	17.93	
		intercept	9.21	

Table 9.28

esults as predictors of nursing and all provider visits, by first thirty days: Nursing diagnosis (RN Dx) and intervention (RN Rx) home health care components

Nursing visits					All provider visits			
Type	Variable	Coefficient	P value	Rank	Type	Variable	Coefficient	P value
N Rx	Wound care	2.79	0.00	1	RN Rx	Wound care	2.50	0.00
N Rx	Metabolic	1.40	0.00	2	RN Dx	Self-care	2.14	0.00
N Dx	Tissue integrity	1.38	0.00	3	RN Dx	Role relationship	1.96	0.00
N Rx	Physical regulation	0.69	0.00	4	RN Dx	Activity	1.60	0.00
N Dx	Physical regulation	0.64	0.00	5	RN Dx	Tissue integrity	1.36	0.00
N Rx	Fluid volume	0.53	0.00	6	RN Rx	Metabolic	0.93	0.00
N Dx	Coping	0.53	0.03	7	RN Dx	Metabolic	0.89	0.00
N Dx	Fluid volume	0.45	0.01	8	RN Rx	Skilled observation	0.88	0.00
N Dx	Self-concept	0.42	0.13	9	RN Rx	Digestive	0.77	0.00
N Dx	Metabolic	0.36	0.09	10	RN Rx	Physical regulation	0.77	0.00
N Rx	Self-concept	0.34	0.16	11	RN Rx	Urinary elimination	0.73	0.00
N Dx	Cognitive	0.32	0.01	12	RN Dx	Coping	0.66	0.07
N Rx	Skilled observation	0.26	0.03	13	RN Dx	Sensory	0.48	0.04
N Dx	Medication	0.25	0.34	14	RN Dx	Health behavior	0.48	0.07
N Rx	Respiratory	0.25	0.18	15	RN Dx	Cognitive	0.47	0.01
N Dx	Respiratory	0.25	0.11	16	RN Rx	Tissue integrity	0.45	0.02
N Dx	Digestive	0.24	0.11	17	RN Rx	Health behavior	0.43	0.02
N Dx	Health behavior	0.24	0.19	18	RN Rx	Cognitive	0.43	0.19
N Rx	Digestive	0.21	0.14	19	RN Dx	Physical regulation	0.42	0.15
N Rx	Urinary elimination	0.20	0.25	20	RN Rx	Respiratory	0.40	0.13
N Dx	Cardiac output	0.19	0.16	21	RN Rx	Fluid volume	0.37	0.09
N Rx	Medication	0.16	0.23	22	RN Dx	Fluid volume	0.28	0.29
N Rx	Tissue perfusion	0.15	0.29	23	RN Dx	Medication	0.24	0.53
N Dx	Sensory	0.09	0.58	24	RN Rx	Medication	0.17	0.38
N Dx	Tissue perfusion	0.05	0.72	25	RN Rx	Self-care	0.14	0.60
N Dx	Role relationship	0.02	0.95	26	RN Dx	Self-concept	0.12	0.75
N Rx	Sensory	0.00	0.98	27	RN Rx	Cardiac output	0.12	0.54
N Dx	Self-care	−0.00	1.00	28	RN Dx	Tissue perfusion	0.11	0.62
N Rx	Nutritional	−0.05	0.69	29	RN Rx	Tissue perfusion	0.01	0.95
N Rx	Cardiac output	−0.05	0.69	30	RN Rx	Self-concept	0.01	0.98
N Rx	Self-care	−0.10	0.59	31	RN Rx	Injury/safety	−0.00	0.99
N Rx	Activity	−0.14	0.35	32	RN Dx	Cardiac output	−0.05	0.79
N Rx	Coping	−0.14	0.54	33	RN Dx	Digestive	−0.09	0.70
N Rx	Tissue integrity	−0.14	0.32	34	RN Rx	Sensory	−0.16	0.51
N Rx	Injury/safety	−0.16	0.27	35	RN Dx	Urinary elimination	−0.23	0.36
N Rx	Health behavior	−0.19	0.13	36	RN Rx	Role relationship	−0.29	0.50
N Dx	Injury/safety	−0.23	0.26	37	RN Dx	Respiratory	−0.32	0.15
N Dx	Nutritional	−0.32	0.05	38	RN Rx	Nutritional	−0.33	0.09
N Dx	Urinary elimination	−0.32	0.07	39	RN Dx	Injury/safety	−0.41	0.16
N Rx	Role relationship	−0.35	0.24	40	RN Rx	Activity	−0.59	0.00
N Rx	Cognitive	−0.37	0.11	41	RN Rx	Coping	−0.75	0.02
N Dx	Activity	−0.53	0.00	42	RN Dx	Nutritional	−0.87	0.00
	R^2		0.121			R^2		0.099
	mean		7.52			mean		11.03
	intercept		5.05			intercept		6.56

Table 9.30

Regression results as predictors of nursing visits, by first thirty days: Nursing diagnoses (RN Dx), interventions (RN Rx) home health care components, and demographic (Demo) variables

Rank	Type	Variable	Coefficient	P value
1	RN Rx	Wound care	2.70	0.00
2	RN Dx	Tissue integrity	1.42	0.00
3	RN Rx	Metabolic	1.33	0.00
4	Demo	Careself	0.85	0.00
5	RN Rx	Physical regulation	0.72	0.00
6	Demo	Petshome	0.66	0.00
7	RN Dx	Physical regulation	0.62	0.00
8	RN Rx	Fluid voume	0.56	0.00
9	RN Dx	Coping	0.56	0.03
10	Demo	Comprehends	0.55	0.00
11	RN Dx	Fluid volume	0.46	0.01
12	Demo	Married	0.43	0.00
13	RN Dx	Self-concept	0.36	0.18
14	RN Dx	Metabolic	0.34	0.11
15	RN Dx	Cognitive	0.32	0.01
16	RN Rx	Self-concept	0.31	0.21
17	RN Rx	Urinary elimination	0.30	0.08
18	RN Dx	Respiratory	0.29	0.07
19	RN Rx	Skilled observation	0.27	0.03
20	RN Dx	Digestive	0.25	0.10
21	RN Dx	Medication	0.24	0.36
22	RN Rx	Respiratory	0.24	0.21
23	RN Rx	Digestive	0.21	0.15
24	RN Dx	Cardiac output	0.19	0.16
25	RN Rx	Tissue perfusion	0.18	0.19
26	Demo	Alone	0.16	0.36
27	RN Dx	Health behavior	0.15	0.41
28	RN Dx	Role relationship	0.14	0.64
29	RN Rx	Medication	0.08	0.53
30	RN Dx	Sensory	0.08	0.61
31	RN Dx	Self-care	0.06	0.66
32	RN Dx	Tissue perfusion	0.03	0.85
33	RN Rx	Sensory	0.00	0.98
34	Demo	Age	-0.01	0.05
35	RN Rx	Self-care	-0.04	0.83
36	RN Rx	Tissue integrity	-0.05	0.75
37	RN Rx	Nutritional	-0.06	0.64
38	RN Rx	Cardiac output	-0.08	0.58
39	RN Rx	Coping	-0.09	0.69
40	Demo	White	-0.15	0.32
41	RN Rx	Injury/safety	-0.15	0.31

Table 9.30 (cont.)

Regression results as predictors of nursing visits, by first thirty days: Nursing diagnoses (RN Dx), interventions (RN Rx) home health care components, and demographic (Demo) variables

Rank	Type	Variable	Coefficient	P value
42	RN Rx	Activity	–0.15	0.29
43	Demo	Male	–0.18	0.16
44	RN Rx	Health behavior	–0.23	0.07
45	RN Dx	Urinary elimination	–0.25	0.16
46	Demo	House	–0.26	0.06
47	RN Dx	Injury/safety	–0.27	0.19
48	RN Dx	Nutritional	–0.33	0.04
49	RN Rx	Role relationship	–0.34	0.24
50	RN Rx	Cognitive	–0.36	0.12
51	RN Dx	Activity	–0.49	0.00
52	Demo	Communicates	–0.70	0.00
		R^2		0.130
		mean		7.51
		intercept		5.93

Table 9.31

Regression results as predictors of all provider visits, by first thirty days:
Nursing diagnoses (RN Dx), interventions (RN Rx) home health care components
demographic (Demo) variables

Rank	Type	Variable	Coefficient	P value
1	RN Rx	Wound care	2.49	0.00
2	RN Dx	Self-care	2.16	0.00
3	RN Dx	Role relationship	2.01	0.00
4	RN Dx	Activity	1.63	0.00
5	RN Dx	Tissue integrity	1.39	0.00
6	RN Rx	Skilled observation	0.85	0.00
7	RN Rx	Metabolic	0.83	0.00
8	RN Dx	Metabolic	0.80	0.01
9	RN Rx	Physical regulation	0.79	0.00
10	RN Rx	Digestive	0.76	0.00
11	RN Rx	Urinary elimination	0.73	0.00
12	Demo	Petshome	0.68	0.02
13	Demo	Married	0.68	0.00
14	RN Dx	Coping	0.64	0.08
15	Demo	Comprehends	0.56	0.01
16	Demo	Careself	0.54	0.02
17	RN Dx	Sensory	0.50	0.03
18	RN Dx	Health behavior	0.47	0.07
19	RN Rx	Cognitive	0.45	0.17
20	RN Rx	Tissue integrity	0.44	0.03
21	RN Dx	Cognitive	0.42	0.02
22	RN Dx	Physical regulation	0.41	0.17
23	RN Rx	Health behavior	0.40	0.03
24	RN Rx	Respiratory	0.38	0.16
25	RN Rx	Fluid voume	0.36	0.10
26	RN Dx	Fluid volume	0.28	0.29
27	RN Dx	Medication	0.20	0.59
28	RN Rx	Self-care	0.16	0.55
29	RN Dx	Self-concept	0.13	0.74
30	RN Rx	Cardiac output	0.11	0.56
31	RN Rx	Medication	0.10	0.59
32	RN Dx	Tissue perfusion	0.07	0.76
33	RN Rx	Tissue perfusion	0.06	0.75
34	RN Rx	Injury/safety	0.01	0.96
35	Demo	Age	-0.01	0.56
36	RN Rx	Self-concept	-0.03	0.93
37	RN Dx	Cardiac output	-0.03	0.88
38	RN Rx	Sensory	-0.10	0.68
39	RN Dx	Digestive	-0.13	0.57
40	Demo	House	-0.13	0.51
41	Demo	Alone	-0.16	0.51

Table 9.31 (cont.)

Regression results as predictors of all provider visits, by first thirty days: Nursing diagnoses (RN Dx), interventions (RN Rx) home health care components demographic (Demo) variables

Rank	Type	Variable	Coefficient	P value
42	RN Dx	Respiratory	−0.21	0.34
43	RN Dx	Urinary elimination	−0.24	0.34
44	RN Rx	Role relationship	−0.28	0.51
45	Demo	Communicates	−0.33	0.19
46	RN Rx	Nutritional	−0.34	0.08
47	RN Dx	Injury/safety	−0.43	0.14
48	Demo	Male	−0.53	0.00
49	RN Rx	Activity	−0.56	0.01
50	Demo	White	−0.58	0.01
51	RN Rx	Coping	−0.67	0.04
52	RN Dx	Nutritional	−0.88	0.00
		R^2		0.103
		mean		11.03
		intercept		7.00

Table 9.32

Regression results as predictors of nursing visits, by total episode: Nursing diagnoses (RN Dx), interventions (RN Rx) home health care components, and demographic (Demo) variables

Rank	Type	Variable	Coefficient	P value
1	RN Rx	Wound care	4.58	0.00
2	RN Rx	Metabolic	3.03	0.00
3	RN Dx	Tissue integrity	2.70	0.00
4	RN Rx	Physical regulation	2.43	0.00
5	RN Dx	Metabolic	2.27	0.00
6	RN Dx	Physical regulation	1.78	0.00
7	Demo	Petshome	1.57	0.00
8	RN Rx	Urinary elimination	1.44	0.00
9	Demo	Careself	1.13	0.00
10	RN Dx	Coping	1,08	0.06
11	RN Dx	Sensory	0.97	0.01
12	RN Dx	Medication	0.94	0.13
13	RN Rx	Tissue integrity	0.69	0.01
14	RN Dx	Tissue perfusion	0.66	0.01
15	RN Dx	Fluid volume	0.82	0.06
16	Demo	Comprehends	0.61	0.02
17	Demo	Married	0.63	0.07
18	RN Dx	Cardiac output	0.60	0.06
19	RN Rx	Skilled observation	0.60	0.03
20	Demo	Alone	0.57	0.15
21	RN Dx	Digestive	0.54	0.13
22	RN Dx	Respiratory	0.52	0.15
23	RN Dx	Urinary elimination	0.51	0.21
24	RN Dx	Self-concept	0.51	0.42
25	RN Rx	Respiratory	0.50	0.25
26	RN Rx	Coping	0.49	0.35
27	RN Rx	Medication	0.36	0.25
28	RN Dx	Self-care	0.34	0.31
29	RN Rx	Sensory	0.32	0.42
30	RN Rx	Digestive	0.31	0.37
31	RN Rx	Fluid voume	0.26	0.46
32	RN Dx	Health behavior	0.20	0.64
33	RN Dx	Cognitive	0.16	0.57
34	Demo	House	0.10	0.76
35	RN Rx	Cardiac output	−0.02	0.96
36	Demo	Age	−0.02	0.19
37	RN Dx	Role relationship	−0.03	0.97
36	RN Rx	Injury/safety	−0.03	0.92
39	Demo	White	−0.11	0.75
40	RN Dx	Injury/safety	−0.11	0.61
41	RN Rx	Nutritional	−0.11	0.72

Table 9.32 (cont.)

Regression results as predictors of nursing visits, by total episode: Nursing diagnoses (RN Dx), interventions (RN Rx) home health care components, and demographic (Demo) variables

Rank	Type	Variable	Coefficient	P value
42	RN Rx	Self-care	-0.12	0.78
43	RN Rx	Tissue perfusion	-0.19	0.55
44	Demo	Male	-0.26	0.38
45	RN Dx	Nutritional	-0.29	0.45
46	RN Dx	Activity	-0.44	0.13
47	RN Rx	Self-concept	-0.46	0.42
48	RN Rx	Health behavior	-0.50	0.09
49	RN Rx	Activity	-0.58	0.09
50	Demo	Communicates	-0.82	0.04
51	RN Rx	Cognitive	-1.08	0.04
52	RN Rx	Role relationship	-1.32	0.05
		R^2		0.106
		mean		11.51
		intercept		5.68

Table 9.33

Regression results as predictors of all provider visits, by total episode: Nursing diagnoses (RN Dx), interventions (RN Rx) home health care components, and demographic (Demo) variables

Rank	Type	Variable	Coefficient	P value
1	RN Dx	Metabolic	4.82	0.00
2	RN Dx	Self-care	4.54	0.00
3	RN Dx	Role relationship	3.85	0.00
4	RN Rx	Wound care	3.75	0.00
5	RN Rx	Physical regulation	3.50	0.00
6	RN Rx	Urinary elimination	3.43	0.00
7	RN Dx	Tissue integrity	3.00	0.00
8	RN Dx	Activity	2.92	0.00
9	RN Rx	Metabolic	2.61	0.00
10	RN Dx	Physical regulation	2.40	0.00
11	RN Rx	Tissue integrity	2.32	0.00
12	RN Dx	Sensory	1.89	0.00
13	RN Rx	Skilled observation	1.84	0.00
14	Demo	Petshome	1.79	0.01
15	RN Dx	Tissue perfusion	1.69	0.00
16	RN Dx	Medication	1.68	0.07
17	Demo	Married	1.46	0.01
18	Demo	Comprehends	1.24	0.02
19	RN Dx	Coping	1.11	0.21
20	RN Dx	Urinary elimination	0.98	0.12
21	RN Rx	Digestive	0.94	0.07
22	Demo	Careself	0.84	0.14
23	RN Rx	Respiratory	0.71	0.29
24	Demo	House	0.67	0.17
25	RN Rx	Health behavior	0.65	0.15
26	RN Dx	Cardiac output	0.42	0.39
27	RN Dx	Health behavior	0.35	0.58
28	RN Rx	Injury/safety	0.35	0.52
29	RN Dx	Digestive	0.30	0.58
30	RN Rx	Self-care	0.27	0.68
31	RN Rx	Medication	0.23	0.84
32	RN Rx	Cardiac output	0.22	0.68
33	RN Dx	Cognitive	0.20	0.64
34	RN Dx	Fluid volume	0.19	0.78
35	Demo	Communicates	0.11	0.88
36	Demo	Age	−0.02	0.36
37	Demo	Alone	−0.03	0.98
38	RN Rx	Sensory	−0.09	0.88
39	RN Dx	Respiratory	−0.10	0.86
40	RN Dx	Self-concept	−0.16	0.87
41	RN Rx	Cognitive	−0.28	0.73

Table 9.33 (cont.)

Regression results as predictors of all provider visits, by total episode: Nursing diagnoses (RN Dx), interventions (RN Rx) home health care components, and demographic (Demo) variables

Rank	Type	Variable	Coefficient	P value
42	RN Dx	Injury/safety	−0.36	0.62
43	RN Rx	Tissue perfusion	−0.53	0.28
44	RN Rx	Nutritional	−0.56	0.24
45	RN Rx	Fluid voume	−0.60	0.27
46	Demo	White	−0.63	0.22
47	RN Rx	Coping	−0.64	0.42
48	Demo	Male	−1.06	0.02
49	RN Dx	Nutritional	−1.07	0.06
50	RN Rx	Self-concept	−1.23	0.16
51	RN Rx	Activity	−1.47	0.00
52	RN Rx	Role relationship	−2.00	0.05
		R^2		0.100
		mean		17.93
		intercept		6.11

Figure 9.1

Regression coefficients of nursing and all provider visits, by first thirty days and total episode: Demographic variables

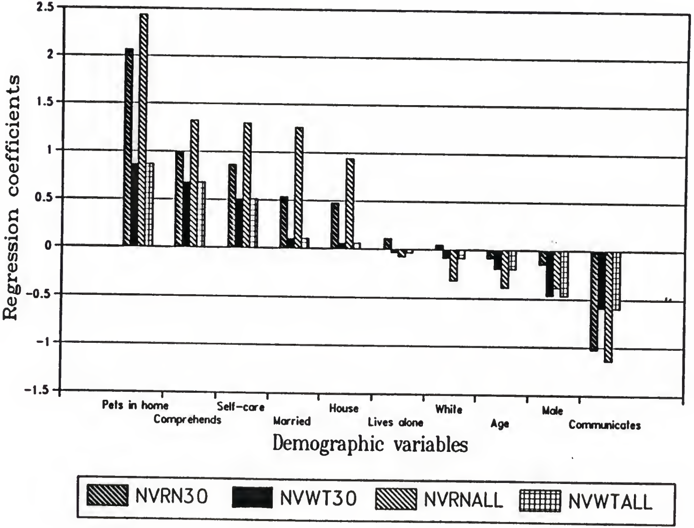


Figure 9.2

Mean nursing and provider visits, by first thirty days and total episode: RUGS activities of daily living

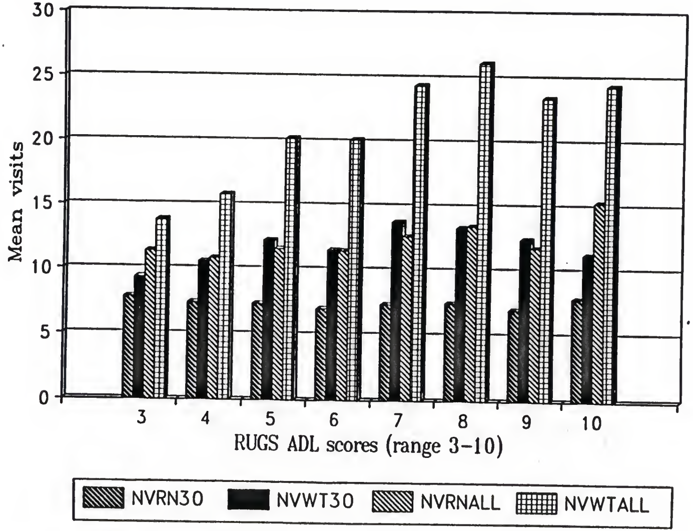


Figure 9.3

Mean nursing and provider visits, by first thirty days and total episode: GU activities of daily living (ADL)

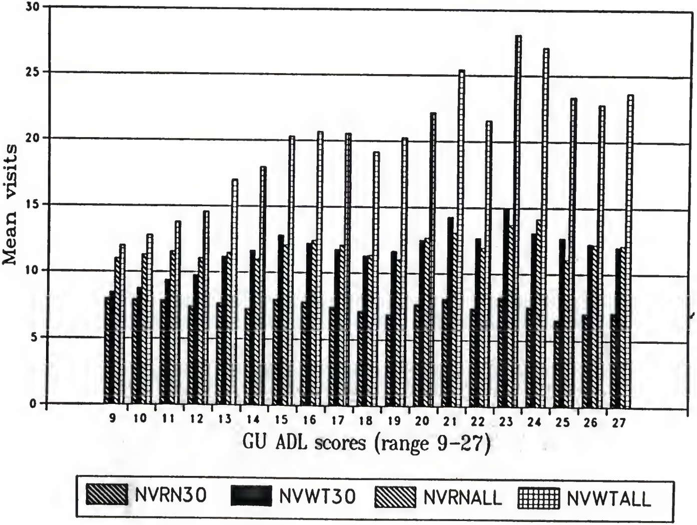


Figure 9.4

Regression coefficients of nursing and all provider visits, by first thirty days and total episode: Nursing diagnosis home health care components

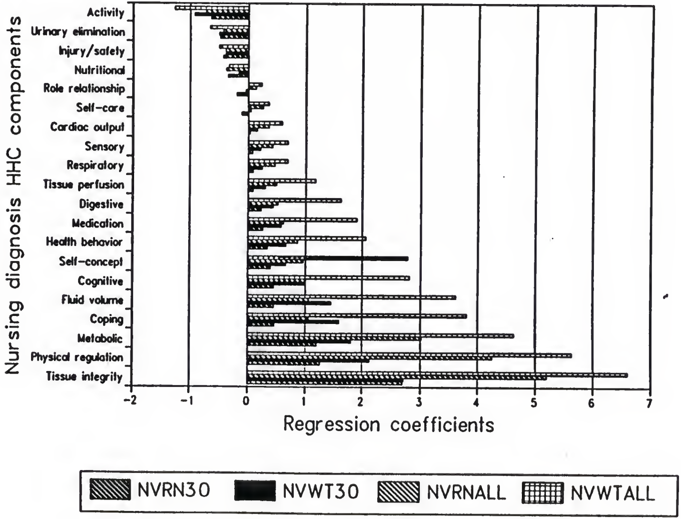


Figure 9.5

Regression coefficients for nursing and all provider visits, by first thirty days and total episode:
Nursing intervention home health care components

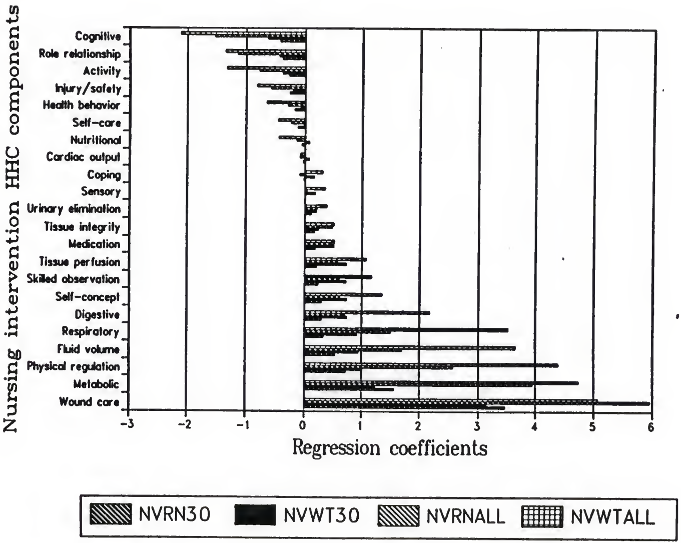
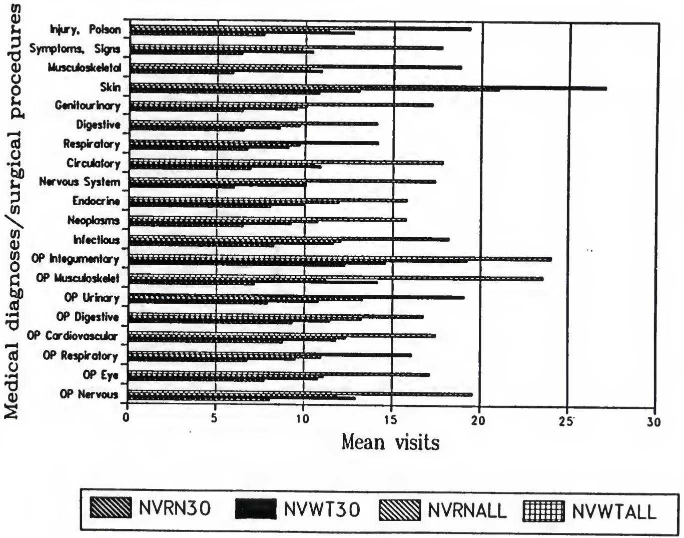


Figure 9.6

Mean nursing and all provider visits, by first thirty days and total episode: Medical diagnoses or surgical procedures



10. COHORT FINDINGS

Cohort Categorical Models

Categorical models were explored to test the effect of the three cohorts on the length of the episodes of care. The cohorts were considered to be a possible approach for classifying home health Medicare patients along with patient characteristics, assessments and services required.

The three cohorts were based on the types of cases and length of episodes in days: (a) short term case (under 30 days), (b) intermediate case (30 to 120 days, and (c) long term case (over 120 days). They were tested on the mean number of nursing and all provider visits for the first thirty (30) days and for the entire episode of home health care. They were the same four dependent variables used in the regression and categorical models.

The cohort models also tested the effect of the three cohorts on the independent variables: (a) ten demographic variables, (b) twenty (20) nursing diagnosis home health care components, (c) twenty-two (22) nursing intervention home health care components, and (d) twenty (20) medical diagnosis or surgical procedure groups. They examined each of the single demographic variables, nursing diagnosis and nursing intervention home health care components, and medical diagnosis or surgical procedure groups independently. This permitted comparisons of each category with the total study cases without the multivariate adjustments for multiple nursing diagnoses or nursing interventions in the same case.

The mean results for cohort one (short term cases) for the first thirty (30) days were extremely significant and far more interesting than those presented for cohorts two and three for the total episode. Cohort one had the same mean results for the first thirty (30) days as for the total episode because the total episode was thirty (30) days or less. Cohorts two and three obviously had higher mean visits because the duration of the episode was longer. However, the most interesting results compared the first thirty (30) days for cohort one to cohorts two and three.

The cohort results suggested fundamental differences between the three cohorts and reinforced the effects of demographics, nursing diagnosis and nursing interventions HHC components, and medical diagnosis or surgical procedure groups previously demonstrated by the regression and categorical models which used multivariate statistics.

Demographic Cohort Categorical Models

The demographic cohort models shown in Tables 10.1 and 10.2 presented the findings which were easiest to interpret for nursing visits and all provider visits for first thirty (30) days. Increasing **age** again showed slightly lower visit rates across all cohort classes. **Females** tended to have higher visit rates as did **non-white** and **married** cases. The **primary caregiver** other than self, **unable to communicate** and **comprehends** led to higher number of visits even though they were considered to be barriers to home care. **Pets in the home** and **housing** also had higher visits. The key finding was that these effects were consistent across all cohorts and that the intermediate and long term cases had higher visit rates during the first thirty (30) days.

Nursing Diagnosis Components Cohort Categorical Models

The visit rates by cohort for the twenty (20) nursing diagnosis home health care components are presented in Tables 10.3 and 10.4. Mean visit rates differed consistently by cohort for all categories. **Tissue/skin integrity** component had the highest rates: 6.89, 11.15, and 11.04, for nursing visits in the first thirty (30) days. **Activity** component had the lowest rates 5.56, 8.66, 8.96, of the twenty (20) nursing diagnosis components.

The mean number of nursing visits for all nursing diagnosis components during the first thirty (30) days was more dramatic in cohort one with a very narrow range of mean visits between 5.56 and 6.89, and all provider visits between 7.5 and 9.2. Cohorts two and three had wider ranges for both nursing and all provider visits.

Nursing Intervention Components Cohort Categorical Models

The nursing intervention components shown in Tables 10.5 and 10.6 presented the mean visits by cohort for the twenty-two (22) nursing intervention home health care components. The differences in visits for cohort one versus cohorts two and three in the first thirty (30) days were striking especially for categories such as **wound care**, which had the highest mean number of nursing visits with 7.33 versus 12.27 and 12.71 for cohorts two and three, versus 9.20, 16.94 and 16.61 for all provider visits. Still another was the **Metabolic** component (i.e.diabetic care) with 6.51, 10.34 and 10.96 for nursing visits, versus 8.26, 14.64 and 15.60 for all providers.

The mapping of nursing diagnosis to the nursing intervention components was also significant and worth noting. Both components presented similar findings for nursing visits in the first thirty (30) days for cohort one. These findings were significant enough to be considered as part of the classification method for home health Medicare patients.

Medical Diagnosis or Surgical Procedure Groups Cohort Categorical Models

The results of the twenty (20) medical diagnosis and surgical procedure groups shown in Tables 10.7 and 10.8 had similar patterns. The findings were similar for the three cohorts and the patterns of mean visits were consistent with slightly higher rates in cohorts two and three for all categories even when only the first thirty (30) days were examined.

In several areas, cohort two had higher rates than the long term cases in cohort three, presumably due to rehabilitation and stabilization activities early in the case as contrasted with chronic maintenance care later on. **Skin Disease conditions** along with **operations** of the skin, and **digestive system operations** had the highest mean visits. Also **endocrine** and **infectious diseases** had more mean visits across all cohorts.

Cohort Frequencies

In addition to comparing visit rates, the cohort models permitted comparisons of frequency distributions of the demographic variables, nursing diagnosis and intervention home health care components and medical and surgical procedure groups between the three cohorts.

Differences in the characteristics of the three cohorts are key to developing a prospective payment method for classifying cases into cohorts. However, the retrospective data used in this study can only suggest possible differences which must be tested prospectively and through periodic case reassessments.

The visit rates of nursing and all provider visits were compared for each of the three cohorts. The visit rates shown in Table 10.9 underscored the wide disparity between the mean visits in cohort one versus those in cohorts two and three. The lowest visit rates were 5.8 for nursing visits and 7.8 for all provider visits in cohort one.

The most significant findings were the mean number of nursing visits which ranged between 9.3 - 9.2, and 14.3 - 13.7 for all provider visits during the first thirty (30) days for both intermediate and long term cases. These findings identified a significant difference between the short term acute care cases of under thirty (30) days and the intermediate and long term cases over thirty (30) days. They also demonstrated that home health visits could be predicted with a greater level of precision for cohort one than for cohorts two and three. Hence visits for both nursing and all provider were considered to be predictable for the first thirty (30) days with the existing data.

Demographic Cohort Frequencies

The frequency distributions for all provider visits for the demographic variables were indicative of the sample cases. As shown in Table 10.10 the actual numbers, not only changed, but also the percents changed among the three cohorts. In many variables even though the numbers decreased the percents increased between cohorts. Most of the age groups decreased in numbers and percents except for the percent for the 85 years of age and older group which increased from cohort one to three. On the other hand the percents for married, does not live alone and does not have an available caregiver increased from cohort one to three. These findings revealed that demographics did have a relationship to care requirements.

Nursing Diagnosis and Nursing Intervention Components Cohort Frequencies

The frequency distributions for the twenty (20) nursing diagnosis and twenty (20) two nursing intervention components were the most significant. They both presented similar findings, but because the data were collected retrospectively it was not possible to identify specific differences between cohorts.

As shown in Tables 10.11 and 10.12 the numbers of cases were similar for cohorts one and two and decreased markedly in cohort three. However, there was a wider difference in percents of nursing diagnosis and nursing intervention components between cohort one and cohorts two and three then between cohort two and three. These marked differences again highlighted the high acute care cases being resolved and discharged within the first thirty (30) days.

In general, the majority of nursing diagnosis and intervention components percents increased for the longer cases. This finding further suggested that the long term cases tended to have more nursing diagnoses (patient problems) and required more nursing interventions (care requirements) for the longer episodes of care. However the specific clusters of variables were not feasible to determine in this retrospective study.

Medical Diagnosis or Surgical Procedure Groups Cohort Frequencies

The frequency distributions of the twenty (20) medical diagnosis or surgical procedure groups shown in Table 10.13 indicated that there were little differences between the three cohorts. These findings demonstrated that medical diagnosis or surgical procedure groups were not predictors of length of episode and were weaker when compared with the nursing diagnoses and nursing interventions.

Table 10.1

Mean results of nursing and all provider visits by first thirty days for three cohorts: Demographic variables*

		Nursing visits				All provider visits			
		Cohort				Cohort			
		1	2	3	All	1	2	3	All
Variable	N	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Age									
<65	705	6.35	11.07	9.52	8.66	7.75	15.74	13.97	11.74
65–69	1017	5.89	10.18	9.71	8.04	7.56	14.69	14.49	11.17
70–74	1698	5.85	9.44	9.49	7.60	7.95	14.54	14.27	11.15
75–79	1877	5.88	8.97	8.89	7.43	8.00	13.94	12.84	10.91
80–84	1663	5.36	8.89	9.37	7.14	7.52	14.27	14.06	10.86
85+	1501	5.57	8.41	8.33	7.02	7.85	13.64	13.23	10.79
Sex									
Female	5221	5.73	9.25	9.36	7.50	7.88	14.40	14.09	11.12
Male	3240	5.79	9.29	8.77	7.53	7.66	14.16	13.10	10.88
Race									
Non–white	1804	5.78	9.19	9.93	7.54	8.23	14.52	14.43	11.37
White	6657	5.75	9.29	8.92	7.50	7.68	14.25	13.51	10.93
Marital status									
Other	4989	5.67	9.23	9.10	7.41	7.66	14.14	13.19	10.78
Married	3472	5.88	9.32	9.16	7.66	8.00	14.55	14.29	11.38
Living arrangements									
Other	5839	5.75	9.04	9.17	7.45	7.86	14.37	14.18	11.20
None	2622	5.76	9.82	9.00	7.64	7.67	14.17	12.31	10.64
Primary caregiver									
Other	6228	5.67	8.88	8.88	7.31	7.85	14.30	13.63	11.09
Self	2233	5.98	10.37	10.05	8.07	7.64	14.33	13.94	10.84
Housing									
Other	2363	5.83	9.66	9.33	7.61	7.92	14.18	13.70	10.84
House	6098	5.72	9.13	9.07	7.47	7.74	14.35	13.70	11.10
Comprehension level									
Able	6229	5.79	9.31	9.48	7.54	7.76	14.11	13.61	10.86
Partially able	1874	5.72	9.16	8.35	7.49	7.97	14.73	14.11	11.53
Unable	358	5.35	9.07	8.47	7.13	7.56	15.48	12.98	11.22
Communication skills									
Able	7066	5.82	9.46	9.38	7.63	7.76	14.19	13.56	10.93
Partially able	1149	5.54	8.33	8.21	6.98	8.25	14.94	14.54	11.69
Unable	246	4.77	8.25	7.92	6.52	6.88	14.70	13.15	10.73
Pets in home									
No	7603	5.74	9.15	8.97	7.43	7.79	14.19	13.51	10.94
Yes	858	5.91	10.25	10.17	8.24	7.81	15.30	14.93	11.82
All	8461	5.75	9.27	9.13	7.51	7.79	14.31	13.70	11.03

* Cohorts: 1 = under 30 days, 2 = 30–120 days, 3 = over 120 days

Table 10.2

Mean results of nursing and all provider visits by total episade for three cohorts: Demographic variables*

		Nursing visits				All provider visits			
			Cohort				Cohort		
Variable	N	1 Mean	2 Mean	3 Mean	All Mean	1 Mean	2 Mean	3 Mean	All Mean
Age									
<65	706	6.35	17.72	34.04	13.96	7.75	26.37	54.04	20.31
65–69	1017	5.89	15.86	37.03	12.27	7.56	24.26	59.89	18.25
70–74	1698	5.85	15.04	33.04	11.36	7.95	24.43	55.29	17.76
75–79	1877	5.88	14.32	34.83	11.47	8.00	23.17	52.10	17.53
80–84	1663	5.36	13.67	34.02	10.77	7.52	23.15	59.48	17.58
85+	1503	5.57	13.32	30.23	10.91	7.85	22.12	54.03	17.75
Sex									
Female	5224	5.73	14.56	34.18	11.47	7.88	23.79	56.58	18.04
Male	3240	5.79	14.73	32.64	11.60	7.66	23.37	53.69	17.78
Race									
Non–white	1804	5.78	14.45	33.81	11.39	8.23	23.97	55.47	18.18
White	6660	5.75	14.67	33.51	11.55	7.68	23.53	55.43	17.88
Marital status									
Other	4992	5.67	14.67	34.17	11.32	7.66	23.47	53.28	17.30
Married	3472	5.88	14.55	32.88	11.80	8.00	23.85	57.98	18.87
Living arrangements									
Other	5840	5.75	14.21	33.26	11.52	7.86	23.75	57.24	18.52
Alone	2624	5.76	15.60	34.45	11.52	7.67	23.32	50.33	16.66
Primary caregiver									
Other	6230	5.67	14.06	32.92	11.34	7.85	23.74	56.03	18.34
Self	2234	5.98	16.22	36.02	12.00	7.64	23.29	53.23	16.82
Housing									
Other	2365	5.83	14.98	32.19	11.11	7.92	22.84	52.01	16.59
House	6099	5.72	14.49	33.98	11.67	7.74	23.91	56.46	18.47
Comprehension level									
Able	6232	5.79	14.66	35.18	11.48	7.76	23.08	54.54	17.34
Partially Able	1874	5.72	14.53	29.38	11.59	7.97	24.97	55.91	19.47
Unable	358	5.35	14.50	32.81	11.72	7.56	25.86	63.55	20.39
Communication Skills									
Able	7069	5.82	14.85	34.65	11.63	7.76	23.21	54.11	17.50
Partially Able	1149	5.54	13.28	28.84	10.83	8.25	25.45	60.03	20.00
Unable	246	4.77	14.39	31.44	11.43	6.88	27.29	62.93	20.96
Pets in home									
No	7606	5.74	14.42	32.96	11.29	7.79	23.40	54.82	17.66
Yes	858	5.91	16.39	37.55	13.49	7.81	25.56	59.47	20.47
All	8464	5.75	14.62	33.57	11.52	7.80	23.63	55.44	17.94

* Cohorts: 1 = under 30 days, 2 = 30–120 days, 3 = over 120 days

Table 10.3

Mean results of nursing and all provider visits by first thirty days for three cohorts: Nursing diagnosis home health care components*

RN Dx Component	Visits				Nursing visits				All provider visits			
		Cohort N				Cohort means				Cohort means		
	All N	1	2	3	All Mean	1	2	3	All Mean	1	2	3
Activity	3606	1674	1662	270	7.24	5.56	8.66	8.96	12.21	8.58	15.48	14.62
Cardiac output	2265	1013	1085	167	7.44	5.67	8.74	9.64	10.81	7.65	13.20	14.51
Cognitive	4481	2210	1962	309	7.66	5.82	9.43	9.68	11.40	7.96	14.77	14.62
Coping	533	246	242	45	8.13	5.97	10.09	9.38	12.46	8.50	16.31	13.45
Digestive	1985	962	853	170	7.76	5.96	9.51	9.21	11.60	8.17	14.82	14.85
Fluid	1067	489	477	101	7.96	6.13	9.45	9.77	11.68	8.52	14.43	13.95
Health behavior	1020	499	460	61	7.73	5.84	9.30	11.45	11.77	8.28	15.06	15.49
Injury/safety	788	362	358	68	7.36	5.50	9.09	8.22	11.16	7.71	14.47	12.13
Medication	442	178	214	50	8.03	6.60	8.97	9.14	11.65	8.60	13.65	13.95
Metabolic	949	351	482	116	8.58	6.51	9.74	10.00	12.11	8.39	14.06	15.24
Nutritional	1552	750	670	132	7.51	5.89	9.17	8.23	11.04	7.98	14.13	12.76
Physical regulation	790	356	354	80	8.96	6.25	11.29	10.69	12.35	7.99	16.13	14.94
Respiratory	1885	930	818	137	7.45	5.58	9.33	8.92	10.69	7.52	13.87	13.21
Role relationship	348	132	184	32	7.55	6.00	8.47	8.69	13.89	9.20	17.05	15.08
Self-concept	427	194	197	36	8.09	5.73	10.30	8.64	11.78	7.92	15.41	12.70
Self-care	1933	836	953	144	7.44	5.75	8.79	8.33	13.01	9.17	16.18	14.39
Sensory	1632	774	708	150	7.71	5.96	9.25	9.47	11.91	8.54	15.12	14.20
Tissue perfusion	1635	716	753	166	7.63	5.80	9.17	8.57	11.38	7.69	14.45	13.45
Tissue/skin integrity	3118	1419	1436	263	9.20	6.89	11.15	11.04	12.88	8.92	16.37	15.30
Urinary	1616	728	692	196	7.40	5.64	8.91	8.62	11.70	7.81	15.35	13.29

* Cohorts: 1 = under 30 days, 2 = 30–120 days, 3 = over 120 days

Table 10.4

Mean results of nursing and all provider visits by total episode for three cohorts: Nursing diagnosis home health care components*

RN Dx Component	Visits				Nursing visits				All provider visits			
		Cohort N				Cohort means				Cohort means		
	All N	1	2	3	All Mean	1	2	3	All Mean	1	2	3
Activity	3606	1674	1662	270	11.42	5.56	13.79	33.21	20.28	8.58	26.06	57.17
Cardiac output	2265	1013	1085	167	11.74	5.67	13.73	35.63	18.14	7.65	21.61	59.21
Cognitive	4481	2210	1962	309	11.62	5.82	14.63	33.97	18.36	7.96	23.99	56.97
Coping	533	246	242	45	13.23	5.97	16.10	37.51	21.27	8.50	27.07	59.81
Digestive	1985	962	853	170	12.45	5.96	15.33	34.72	19.88	8.17	24.94	60.73
Fluid	1067	489	477	101	12.81	6.13	14.83	35.68	19.69	8.52	23.54	55.63
Health behavior	1020	499	460	61	11.88	5.84	14.86	38.89	18.86	8.28	25.08	58.50
Injury/safety	788	362	358	68	11.81	5.50	14.61	30.65	18.89	7.71	24.14	50.83
Medication	442	178	214	50	13.28	6.60	14.20	33.16	20.96	8.60	22.53	58.25
Metabolic	949	351	482	116	15.40	6.51	16.30	38.50	23.67	8.39	24.35	67.07
Nutritional	1552	750	670	132	11.99	5.89	14.89	31.95	18.64	7.98	23.42	54.92
Physical regulation	790	356	354	80	14.95	6.25	17.61	41.89	22.19	7.99	26.93	64.36
Respiratory	1885	930	818	137	11.56	5.58	14.66	33.70	17.67	7.52	22.75	56.20
Role relationship	348	132	184	32	11.97	6.00	13.61	27.22	24.20	9.20	29.12	57.75
Self-concept	427	194	197	36	12.72	5.73	16.29	30.89	19.34	7.92	25.35	47.98
Self-care	1933	836	953	144	11.81	5.75	14.17	31.41	22.32	9.17	27.71	63.05
Sensory	1632	774	708	150	12.76	5.96	14.83	38.06	20.49	8.54	25.09	60.40
Tissue perfusion	1635	716	753	166	12.63	5.80	14.69	32.78	20.22	7.69	24.28	55.88
Tissue/skin integrity	3118	1419	1436	263	14.94	6.89	18.08	41.28	22.02	8.92	27.60	62.24
Urinary	1616	728	692	196	12.79	5.64	14.48	33.38	21.81	7.81	26.47	57.34

* Cohorts: 1 = under 30 days, 2 = 30–120 days, 3 = over 120 days

Table 10.5

Mean results of nursing and all provider visits by first thirty days for three cohorts: Nursing intervention home health care components*

	Visits				Nursing visits				All provider visits			
		Cohort N				Cohort means				Cohort means		
RN Rx Component	All N	1	2	3	All Mean	1	2	3	All Mean	1	2	3
Activity	2332	1116	1055	161	7.44	5.89	8.79	9.32	11.24	8.29	13.94	14.01
Cardiac output	3644	1699	1668	277	7.63	5.96	9.06	9.28	11.36	8.08	14.26	14.05
Cognitive	666	309	312	45	7.08	5.72	8.30	7.87	12.09	8.76	15.16	13.68
Coping	703	338	301	64	7.45	5.86	8.91	8.97	10.84	8.19	13.36	12.96
Digestive	2741	1281	1251	209	7.83	6.08	9.47	8.82	11.94	8.52	15.14	13.79
Fluid	1998	974	875	149	8.07	6.30	9.82	9.28	11.70	8.47	14.97	13.63
Health behavior	4051	1942	1801	308	7.55	5.81	9.13	9.27	11.58	8.26	14.69	14.35
Injury/safety	1906	905	862	139	7.37	5.72	8.81	9.26	11.44	8.08	14.55	14.02
Medication	5123	2448	2291	384	7.63	5.81	9.29	9.38	11.22	7.92	14.29	13.91
Metabolic	1605	667	777	161	8.81	6.51	10.34	10.96	12.09	8.26	14.64	15.60
Nutritional	3961	1915	1755	291	7.67	5.88	9.38	9.19	11.17	7.85	14.41	13.49
Physical regulation	4961	2238	2265	458	7.98	6.07	9.59	9.36	11.57	8.14	14.49	13.94
Respiratory	1165	544	531	90	7.51	5.74	9.08	8.97	11.05	7.88	13.85	13.78
Role relationship	376	193	155	28	7.23	6.09	8.45	8.33	11.50	9.03	14.35	12.81
Self-concept	554	278	245	31	7.72	6.04	9.53	8.42	11.57	8.13	14.96	15.72
Self-care	1116	549	487	80	7.48	5.66	9.29	9.00	11.96	8.40	15.69	13.78
Sensory	1474	714	636	124	7.77	5.84	9.55	9.82	11.61	8.19	14.87	14.61
Tissue perfusion	2652	1244	1193	215	7.80	5.98	9.47	9.11	11.47	8.14	14.51	13.92
Tissue/skin integrity	2782	1233	1284	265	7.96	6.10	9.44	9.48	12.18	8.52	15.21	14.59
Urinary	1898	849	824	225	7.67	5.95	9.23	8.49	12.15	8.45	15.56	13.61
Wound care	2618	1237	1194	187	9.96	7.33	12.27	12.71	13.26	9.20	16.94	16.61
Skilled observation	3398	1642	1536	220	7.61	5.91	9.21	9.18	11.54	8.04	14.89	14.36

* Cohorts: 1 = under 30 days, 2 = 30–120 days, 3 = over 120 days

Table 10.6

Mean results of nursing and all provider visits by total episode for three cohorts: Nursing intervention home health care components*

RN Rx Component	Visits				Nursing visits				All provider visits			
		Cohort N				Cohort means				Cohort means		
	All N	1	2	3	All Mean	1	2	3	All Mean	1	2	3
Activity	2332	1116	1055	161	11.43	5.89	13.95	33.39	18.19	8.29	23.03	55.04
Cognitive	666	309	312	45	10.68	5.72	13.00	28.64	19.38	8.76	24.72	55.26
Coping	703	338	301	64	12.19	5.86	14.67	34.00	18.42	8.19	22.48	53.34
Digestive	2741	1281	1251	209	12.47	6.08	15.34	34.52	20.09	8.52	25.54	58.40
Fluid	1998	974	875	149	12.46	6.30	15.51	34.85	19.04	8.47	24.51	56.04
Health behavior	4051	1942	1801	308	11.77	5.81	14.63	32.58	19.21	8.26	24.63	56.63
Injury/safety	1906	905	862	139	11.53	5.72	14.05	33.73	18.90	8.08	24.06	57.40
Medication	5123	2448	2291	384	11.91	5.81	14.69	34.26	18.47	7.92	23.48	55.87
Metabolic	1605	667	777	161	14.87	6.51	16.71	40.65	21.78	8.26	24.40	65.15
Nutritional	3961	1915	1755	291	11.98	5.88	14.89	34.61	18.49	7.85	23.82	56.33
Physical regulation	4961	2238	2265	458	12.94	6.07	15.35	34.57	19.95	8.14	24.24	56.46
Respiratory	1165	544	531	90	11.65	5.74	14.08	33.06	18.16	7.88	22.35	55.56
Role relationship	376	193	155	28	10.45	6.10	12.98	26.39	17.39	9.03	23.30	42.23
Self-concept	554	278	245	31	11.35	6.04	15.15	28.97	18.33	8.13	25.05	56.70
Self-care	1116	549	487	80	11.93	5.66	15.22	34.90	20.38	8.40	27.06	61.98
Sensory	1474	714	636	124	12.65	5.84	15.19	38.82	19.49	8.19	24.28	59.99
Tissue perfusion	2652	1244	1193	215	12.06	5.98	14.82	31.89	18.82	8.14	23.50	54.68
Tissue/skin integrity	2782	1233	1284	265	13.34	6.10	15.37	37.24	21.63	8.52	25.74	62.67
Urinary	1898	849	824	225	13.10	5.95	15.07	32.90	22.44	8.45	26.58	60.08
Wound care	2618	1237	1194	187	15.81	7.33	19.47	48.57	21.69	9.20	27.61	66.48
Skilled observation	3398	1642	1536	220	11.62	5.91	14.50	34.24	18.81	8.04	24.65	58.50

* Cohorts: 1 = under 30 days, 2 = 30–120 days, 3 = over 30 days

Table 10.7

Mean results of nursing and all provider visits by first thirty days for three cohorts: Medical diagnoses or surgical procedures*

	Nursing visits				All provider visits			
	Cohort				Cohort			
Medical diagnoses/ surgical procedures	1 Mean	2 Mean	3 Mean	All Mean	1 Mean	2 Mean	3 Mean	All Mean
OP Nervous	5.93	10.69	6.80	8.07	9.03	17.01	17.75	12.95
OP Eye	5.67	11.06	9.00	7.74	7.13	16.50	15.92	10.82
OP Respiratory	5.14	8.11	10.33	6.76	6.13	13.20	11.70	9.54
OP Cardiovascular	6.47	10.93	12.06	8.77	8.08	15.42	16.76	11.84
OP Digestive	6.65	12.25	13.23	9.33	7.99	15.47	15.40	11.49
OP Urinary	5.97	10.35	9.23	7.93	7.63	14.65	13.14	10.80
OP Musculoskeletal	5.40	8.20	9.20	7.11	9.83	17.29	16.10	14.13
OP Integumentary	8.98	16.38	16.20	12.31	9.98	20.50	18.70	14.59
Infectious	5.81	11.79	9.10	8.25	7.75	17.20	14.08	11.69
Neoplasms	5.40	8.07	7.21	6.50	7.52	11.95	9.54	9.27
Endocrine	6.31	9.91	8.85	8.04	7.13	12.66	12.73	9.93
Nervous System	4.86	7.26	7.69	6.01	7.50	13.25	11.45	10.05
Circulatory	5.35	8.25	8.51	6.92	7.57	13.59	14.97	10.88
Respiratory	5.43	8.26	7.76	6.74	6.72	11.82	10.42	9.04
Digestive	4.76	9.33	8.20	6.52	5.66	12.87	12.91	8.54
Genitourinary	5.22	8.40	7.21	6.46	6.79	13.29	12.88	9.53
Skin	7.19	13.01	14.30	10.80	8.66	15.54	18.56	13.12
Musculoskeletal	4.77	6.65	11.60	5.92	7.97	13.99	16.92	10.93
Symptoms, Signs	4.98	7.95	6.12	6.40	7.12	13.89	10.29	10.43
Injury, Poison	6.16	8.95	9.82	7.65	9.66	15.70	14.08	12.71
All	5.76	9.30	9.35	7.54	7.82	14.46	13.98	11.14

* Cohorts: 1 = under 30 days, 2 = 30-120 days, 3 = over 120 days

Table 10.8

Mean results of nursing and all provider visits by total episode for three cohorts: Medical diagnoses or surgical procedures*

Medical diagnoses/ surgical procedures	Nursing visits				All provider visits			
	Cohort				Cohort			
	1 Mean	2 Mean	3 Mean	All Mean	1 Mean	2 Mean	3 Mean	All Mean
OP Nervous	5.93	17.22	28.00	11.91	9.03	27.64	60.87	19.58
OP Eye	5.67	16.64	50.67	11.13	7.13	26.53	96.97	17.13
OP Respiratory	5.14	13.38	39.00	10.98	6.13	22.85	47.36	16.11
OP Cardiovascular	6.47	16.44	38.67	12.39	8.08	24.27	53.85	17.44
OP Digestive	6.65	18.27	41.74	13.28	7.99	23.58	53.20	16.78
OP Urinary	5.97	17.15	37.77	13.33	7.63	24.22	59.59	19.04
OP Musculoskeletal	5.40	12.85	33.57	11.21	9.83	29.49	61.51	23.60
OP Integumentary	8.98	27.34	52.93	19.22	9.98	35.70	68.03	24.06
Infectious	5.81	17.65	36.40	12.11	7.75	28.59	50.92	18.20
Neoplasms	5.40	14.41	29.50	10.73	7.52	21.76	43.26	15.74
Endocrine	6.31	15.51	28.10	11.96	7.13	20.53	44.39	15.79
Nervous System	4.86	11.24	43.63	10.08	7.50	21.75	68.90	17.41
Circulatory	5.35	12.94	31.05	10.54	7.57	22.36	59.65	17.81
Respiratory	5.43	12.95	24.24	9.72	6.72	19.38	41.36	14.13
Digestive	4.76	14.54	31.53	9.69	5.66	21.12	58.86	14.12
Genitourinary	5.22	14.04	24.00	10.07	6.79	23.81	53.13	17.25
Skin	7.19	22.44	59.73	21.04	8.66	27.60	83.27	27.08
Musculoskeletal	4.77	11.39	55.10	10.26	7.97	24.37	83.20	18.83
Symptoms, Signs	4.98	12.43	19.79	9.77	7.12	23.08	41.94	17.71
Injury, Poison	6.16	13.87	35.41	11.28	9.66	25.36	54.36	19.32
All	5.76	14.67	34.26	11.58	7.82	23.92	56.24	18.13

* Cohorts: 1 = under 30 days, 2 = 30-120 days, 3 = over 120 days

Table 10.9

Mean nursing and provider visits, by first thirty days and total episode: Three cohorts

	First thirty days of episode					
	Nursing visits			All provider visits		
Cohort	N	Mean	SD	N	Mean	SD
Short term care (under 30 days)	4253	5.76	4.05	4253	7.79	5.66
Intermediate care (30-120 days)	3715	9.28	6.36	3715	14.33	8.66
Long term care (over 120 days)	583	9.15	7.15	583	13.69	7.28

	Total episode					
	Nursing visits			All provider visits		
Cohort	N	Mean	SD	N	Mean	SD
Short term care (under 30 days)	4253	5.76	4.05	4253	7.79	5.66
Intermediate care (30-120 days)	3715	14.64	11.16	3715	23.66	16.50
Long term care (over 120 days)	583	33.66	28.27	583	55.46	38.39

Table 10.10

Frequency distributions of all home visits for cases by three cohorts: Demographic variables*

	Cohort				Cohort			
Demo Variable	1 #	2 #	3 #	All #	1 %	2 %	3 %	All %
Age								
<65	337	297	72	706	8.0	8.1	12.3	8.3
65-69	500	454	63	1017	11.9	12.4	10.8	12.0
70-74	869	732	97	1698	20.6	19.9	16.6	20.1
75-79	936	816	125	1877	22.2	22.2	21.4	22.2
80-84	837	721	105	1663	19.9	19.6	18.0	19.6
85+	731	651	121	1503	17.4	17.7	20.8	17.8
Sex								
Female	2614	2257	353	5224	62.1	61.5	60.5	61.7
Male	1596	1414	230	3240	37.9	38.5	39.5	38.3
Race								
Non-white	900	786	118	1804	21.4	21.4	20.2	21.3
White	3310	2885	465	6660	78.6	78.6	79.8	78.7
Marital status								
Not married	2542	2135	315	4992	60.4	58.2	54.0	59.0
Married	1668	1536	268	3472	39.6	41.8	46.0	41.0
Lives alone								
No	2831	2578	431	5840	67.2	70.2	73.9	69.0
Yes	1379	1093	152	2624	32.8	29.8	26.1	31.0
Cares for self								
No	3052	2718	460	6230	72.5	74.0	78.9	73.6
Yes	1158	953	123	2234	27.5	26.0	21.1	26.4
Own home								
No	1253	978	134	2365	29.8	26.6	23.0	27.9
Yes	2957	2693	449	6099	70.2	73.4	77.0	72.1
Comprehension level								
Able	3155	2677	400	6232	74.9	72.9	68.6	73.6
Partially able	874	853	147	1874	20.8	23.2	25.2	22.1
Unable	181	141	36	358	4.3	3.8	6.2	4.2
Communication skills								
Able	3537	3068	464	7069	84.0	83.6	79.6	83.5
Partially able	553	502	94	1149	13.1	13.7	16.1	13.6
Unable	120	101	25	246	2.9	2.8	4.3	2.9
Pets in home								
No	3815	3286	505	7606	90.6	89.5	86.6	89.9
Yes	395	385	78	858	9.4	10.5	13.4	10.1
All	4210	3671	583	8464	100.0	100.0	100.0	100.0

* Cohorts: 1 = under 30 days, 2 = 30-120 days, 3 = over 120 days

Table 10.11

Frequency distributions of all home visits for cases by three cohorts: Nursing diagnosis home health care components*

	Cohort				Cohort			
RN Rx Component	1 #	2 #	3 #	All #	1 %	2 %	3 %	All %
Activity	1674	1662	270	3606	39.8	45.3	46.3	42.6
Cardiac output	1013	1085	167	2265	24.1	29.6	28.6	26.8
Cognitive	2210	1962	309	4481	52.5	53.4	53.0	52.9
Coping	246	242	45	533	5.8	6.6	7.7	6.3
Digestive	962	853	170	1985	22.9	23.2	29.2	23.5
Fluid	489	477	101	1067	11.6	13.0	17.3	12.6
Health behavior	499	460	61	1020	11.9	12.5	10.5	12.1
Injury/safety	362	358	68	788	8.6	9.8	11.7	9.3
Medication	178	214	50	442	4.2	5.8	8.6	5.2
Metabolic	351	482	116	949	8.3	13.1	19.9	11.2
Nutritional	750	670	132	1552	17.8	18.3	22.6	18.3
Physical regulation	356	354	80	790	8.5	9.6	13.7	9.3
Respiratory	930	818	137	1885	22.1	22.3	23.5	22.3
Role relationship	132	184	32	348	3.1	5.0	5.5	4.1
Self-concept	194	197	36	427	4.6	5.4	6.2	5.0
Self-care	836	953	144	1933	19.9	26.0	24.7	22.8
Sensory	774	708	150	1632	18.4	19.3	25.7	19.3
Tissue perfusion	716	753	166	1635	17.0	20.5	28.5	19.3
Tissue/skin integrity	1419	1436	263	3118	33.7	39.1	45.1	36.8
Urinary	728	692	196	1616	17.3	18.9	33.6	19.1
All	4210	3671	583	8464	100.0	100.0	100.0	100.0

* Cohorts: 1 = under 30 days, 2 = 30-120 days, 3 = over 120 days

Table 10.12

Frequency distributions of all home visits for cases by three cohorts: Nursing intervention home health care components*

	Cohort				Cohort			
RN Rx Component	1 #	2 #	3 #	All #	1 %	2 %	3 %	All %
Activity	1116	1055	161	2332	26.5	28.7	27.6	27.6
Cardiac output	1699	1668	277	3644	40.4	45.4	47.5	43.1
Cognitive	309	312	45	666	7.3	8.5	7.7	7.9
Coping	338	301	64	703	8.0	8.2	11.0	8.3
Digestive	1281	1251	209	2741	30.4	34.1	35.8	32.4
Fluid	974	875	149	1998	23.1	23.8	25.6	23.6
Health behavior	1942	1801	308	4051	46.1	49.1	52.8	47.9
Injury/safety	905	862	139	1906	21.5	23.5	23.8	22.5
Medication	2448	2291	384	5123	58.1	62.4	65.9	60.5
Metabolic	667	777	161	1605	15.8	21.2	27.6	19.0
Nutritional	1915	1755	291	3961	45.5	47.8	49.9	46.8
Physical regulation	2238	2265	458	4961	53.2	61.7	78.6	58.6
Respiratory	544	531	90	1165	12.9	14.5	15.4	13.8
Role relationship	193	155	28	376	4.6	4.2	4.8	4.4
Self-concept	278	245	31	554	6.6	6.7	5.3	6.5
Self-care	549	487	80	1116	13.0	13.3	13.7	13.2
Sensory	714	636	124	1474	17.0	17.3	21.3	17.4
Tissue perfusion	1244	1193	215	2652	29.5	32.5	36.9	31.3
Tissue/skin integrity	1233	1284	265	2782	29.3	35.0	45.5	32.9
Urinary	849	824	225	1898	20.2	22.4	38.6	22.4
Wound care	1237	1194	187	2618	29.4	32.5	32.1	30.9
Skilled observation	1642	1536	220	3398	39.0	41.8	37.7	40.1
All	4210	3671	583	8464	100.0	100.0	100.0	100.0

* Cohorts: 1 = under 30 days, 2 = 30-120 days, 3 = over 120 days

Table 10.13

Frequency distributions of all home visits for cases by three cohorts: Medical diagnoses or surgical procedures*

	Cohort				Cohort			
Medical diagnoses/ surgical procedures	1 #	2 #	3 #	All #	1 %	2 %	3 %	All %
OP Nervous	57	49	5	111	1.4	1.4	0.9	1.4
OP Eye	55	33	3	91	1.4	1.0	0.6	1.1
OP Respiratory	66	56	9	131	1.7	1.6	1.7	1.6
OP Cardiovascular	222	208	18	448	5.6	6.0	3.3	5.6
OP Digestive	327	257	31	615	8.3	7.4	5.7	7.7
OP Urinary	68	48	13	129	1.7	1.4	2.4	1.6
OP Musculoskeletal	274	345	46	665	6.9	9.9	8.5	8.4
OP Integumentary	108	74	15	197	2.7	2.1	2.8	2.5
Infectious	93	62	10	165	2.4	1.8	1.8	2.1
Neoplasms	237	150	38	425	6.0	4.3	7.0	5.3
Endocrine	257	222	41	520	6.5	6.4	7.6	6.5
Nervous System	123	91	16	230	3.1	2.6	3.0	2.9
Circulatory	880	895	118	1893	22.3	25.8	21.8	23.8
Respiratory	310	241	38	589	7.9	6.9	7.0	7.4
Digestive	149	84	15	248	3.8	2.4	2.8	3.1
Genitourinary	101	57	19	177	2.6	1.6	3.5	2.2
Skin	104	117	33	254	2.6	3.4	6.1	3.2
Musculoskeletal	97	74	10	181	2.5	2.1	1.8	2.3
Symptoms, Signs	152	146	34	332	3.9	4.2	6.3	4.2
Injury, Poison	267	259	29	555	6.8	7.5	5.4	7.0
All	3947	3468	541	7956	100.0	100.0	100.0	100.0

* Cohorts: 1 = under 30 days, 2 = 30-120 days, 3 = over 120 days

11. HOME HEALTH CARE CLASSIFICATION METHOD

Overview

A preliminary Home Health Care (HHC) Classification System is being proposed that can predict resource requirements and measure outcomes of care for home health Medicare patients. This method combines two types of variables: (a) length of the episode of home health care, and (b) nursing care requirements of a patient.

Background

The Home Health Care Classification Method emerged from the findings of this research. The study identified that the length of the episodes of home health care for fifty percent of the sample cases was under thirty (30) days and the remainder ranged from thirty (30) to over one hundred twenty (120) days. The analysis of the nursing visit data also identified that there was a wide disparity between the 5.8 mean number nursing visits provided during the first thirty (30) days of care and the 9.3 mean visits for the first thirty (30) days for those cases whose episodes were longer than thirty (30) days.

Those with episodes of under thirty (30) days appeared to be acute care cases and needed intense care by multiple providers. They were generally early hospital discharges and had conditions such as surgical procedures or post acute medical conditions that required specific nursing interventions.

The longer cases fell into two cohorts: intermediate and long term care. They were cases that were not as easy to evaluate from retrospective data. Based on professional knowledge, it seemed that the intermediate cases were being rehabilitated or stabilized and required longer skilled nursing services than thirty (30) days including the management, referral and teaching of care. The long term care cases needed continued skilled nursing and other services which were assumed to be those of the home health aide. They were cases with chronic conditions needing continued monitoring and supervision of their care.

There was also a group of patients who deteriorated and died at home, were re-admitted to the hospital, referred to a skilled care facility, or to a terminal care program. This group did not have any consistent pattern for either the length of episode or nursing care requirements. It was assumed that this type case could occur at any time during an episode of care.

Classification Method Framework

Based on the study findings a clinically sound and statistically significant Home Health Care Classification Method was developed. The method uses a framework that encompasses two types of data: (a) length of the episode which consists of three cohorts based on the length of the episode in days, and (b) the nursing care requirements of the patient which consists of at least three levels of care for each of the three cohorts. The nursing care requirements are based on nursing assessment, nursing diagnoses, nursing interventions and other care requirements needed to provide the expected outcome goals.

Length of Episode

The length of the episode consists of three cohorts: (a) short term cases of under 30 days, (b) intermediate cases of 30 to 120 days, and (c) long term cases of over 120 days requiring home health care. The determination of initial placement into a cohort is based on the professional judgment of the admitting nurse and is considered to be a provisional prediction.

Nursing Care Requirements

The nursing care requirements of patients for each of the three cohorts are based on five types of assessment data: (a) ten demographic variables, (b) twenty (20) nursing diagnosis home health care components, (c) measures of outcomes identified by three discharge status goals, (d) twenty (20) nursing intervention home health care components, and (e) four types of nursing interventions. The twenty-two (22) nursing intervention components were restructured to match the twenty (20) home nursing diagnosis components.

The twenty (20) home health care components along with the demographic variables are designed to not only assess the patients on admission to home health care, but also to reassess patients at thirty (30) or sixty (60) day intervals and other predetermined times. The patients are scored for three levels of care for each of the three types of cohorts. The regression coefficients are used to weight and score the patients and predict the average number of home visits.

Assessment Instrument

The Assessment Instrument shown in Figure 11.1 is an instrument that is used to assess and classify a patient. It includes the instructions, definitions, and coding schemes needed to assess the nursing care requirements of a patient. The major coding schemes used are listedin Figure 11.2. They are supplemented by two lists (dictionaries) for the nursing diagnoses and nursing interventions (Appendix 6.1) which are used to identify the specific data elements for each list.

The major coding schemes include:

- **Home Health Care Components**: List of twenty (20).
- **Nursing Diagnoses**: List of one hundred forty-seven (147) nursing diagnoses (Appendix 6.1).
- **Discharge Status**: Three discharge statuses for each nursing diagnosis as measures of expected outcomes.
- **Nursing Interventions**: List of one hundred sixty-six (166) nursing interventions (Appendix 6.1).
- **Nursing Types**: Four types of nursing intervention actions.
- **Medical Diagnosis or Surgical Procedure Groups**: List of twenty (20).
- **Demographic Variables**: List of ten.

Admission Cohort Placement

On admission to home health care each case is placed into one of three cohorts by the admitting nurse:

- Cohort 1: Short term care - under 30 days
- Cohort 2: Intermediate care - 30 to 120 days
- Cohort 3: Long term care - over 120 days

Placement is based on the professional judgement of the admitting nurse and considered at this time to be a provisional prediction. The nurse determines if a patient is either: (a) acute care case which will be resolved during the first thirty days or (b) intermediate or long term case requiring over thirty (30) days of skilled nursing care for rehabilitation, stabilization or chronic care management. Figure 11.3 illustrates the pathways of the classification method process.

Based on this research, only the levels of care scores for the three cohorts for the first thirty (30) days can be validated by the study findings. Further research is needed to refine and validate the levels of care scores for the intermediate care and long term care.

Nursing Care Requirements

Next, the nursing care requirements for each of the twenty (20) components of home health care components are assessed. The specific: (a) nursing diagnoses, (b) discharge statuses, (c) nursing interventions, and (d) types of nursing actions are identified for each of the components that link nursing diagnoses and nursing interventions together. They also provide the framework for identifying the data elements used to score the levels of care for each od the three cohorts.

Home Health Care Component Scores

The assessed data elements for each of the home health care components are scored based on their nursing care requirement coefficients. The resulting values are assigned and used to determine at least three levels of care for each of the three cohorts. They are unique weights used to predict resource requirements in terms of number of visits. The weights for the short term acute care cases for the first thirty (30) days will be different than those for the intermediate or long term care cases.

Demographic Variables

The ten demographic variables are also scored. They function in a similar manner to the twenty (20) components of home health care components. They contribute additional weights for each cohort to predict individualized scores for each cohort.

Re-assessment Intervals

Patients are re-assessed and re-classified at thirty (30) or sixty (60) day intervals or when their health statuses change, i.e new medical conditions, surgical procedure, or hospitalization occurs during the episode.

Classification Method Example

An example of how the home health classification method would be used including the possible pathways for each cohort is described below and illustrated in Figure 11.3.

Cohort One

A patient on admission will be placed by the admitting nurse into cohort one which consists of two pathways: (a) a short term acute care case which will be resolved within thirty (30) days, or (b) an intermediate or long term patient which will take longer than thirty (30) days to resolve. The placement is based on professional judgement and considered to be a provisional prediction.

The admitting nurse completes the Assessment Instrument: (a) identifies the specific nursing data elements for each of the twenty (20) home health care components, and (b) ten demographic variables. The variables are scored and used to verify the placement of the patient into either of the two cohorts (under or over thirty (30) days). Based on the scores and cohort placement the patient is classified into one of three levels of care and assigned the average number of home visits.

Cohort Two

At the end of the first thirty (30) days, a patient who was not discharged is reassessed using the Assessment Instrument. The variables are scored and used to verify the placement of the patient into either of the two cohorts over thirty (30) days. Based on the scores and cohort placement the patient is reclassified into one of three levels of care and again are assigned the average number of home visits.

Cohort two consists of **two pathways**: (a) an intermediate care patient who still needs skilled care to be rehabilitated or stabilized and whose condition should be resolved within thirty (30) or sixty (60) additional days, or (b) a long term care patient who continues to need skilled nursing care and whose duration of home health care is not possible to determine.

Cohort Three

At the end of the second thirty (30) or sixty (60) days a patient who was not discharged is again reassessed using the Assessment Instrument. At that time the patient who was not discharged remains in cohort two or gets placed in cohort three. The variables are scored and used to verify the placement of the patient into either of the two cohorts. Based on the scores and cohort placement the patient is reclassified into one of three levels of care and assigned the average number of home visits.

Cohort three also consists of **two pathways**: (a) an intermediate care patient who still needs home health care to be rehabilitated or stabilized and whose condition should be resolved within another thirty (30) additional days, or (b) a long term care patient who will require monitoring and continued care for at least thirty (30) or sixty (60) additional days.

Exceptions

When the status of a patient changes, i.e have a new medical condition, hospitalized during the episode etc. the patient is reassessed and reclassified using the above process. However, those patients who deteriorate may die at home, be re-admitted to the hospital, referred to a skilled care facility and transferred to a terminal or special long term care program are treated like other discharged patients.

Classification Method Coding Schemes

The coding schemes developed for this research were used for the classification method. They include: (a) nursing diagnoses, (b) discharge statuses, (c) nursing interventions, and (d) types of nursing actions. These were used to identify the nursing care requirements of patients for home health care.

In addition the scheme of twenty (20) home health care components was developed to provide a framework for identifying the specific nursing diagnoses and nursing interventions used to assess and classify the patients. This scheme which is critical to the classification method, links the nursing diagnoses and nursing interventions together. It is also used to score the three levels of care for each of the three cohorts.

In summary, the Home Health Care Classification Method with the Assessment Instrument has potential for reimbursement of home health care and could form the basis for a prospective payment system for the home health care Industry. Additionally the newly developed coding schemes could be used for more efficient documentation of the home health care, for other research studies, and for the design of home health care computer systems.

Figure 11.1

PRELIMINARY HOME HEALTH CARE CLASSIFICATION METHOD
Assessment Instrument

Home health care component	Nursing diagnosis (enter multiple codes/names)	Discharge status goal*			Nursing intervention (enter multiple codes/names)	Type nursing action**				Cohort 1 score			Cohort 2 score			Cohort 3 score		
										Level of care			Level of care			Level of care		
		I	S	D		A	C	T	M	1	2	3	1	2	3	1	2	3
1. Activity																		
2. Cardiac output																		
3. Cognitive																		
4. Coping																		
5. Digestive																		
6. Fluid																		
7. Health behavior																		
8. Injury/safety																		
9. Medication																		
10. Metabolic																		
11. Nutritional																		
12. Physical regulation																		
13. Respiratory																		
14. Role relationship																		
15. Self-concept																		
16. Self-care																		
17. Sensory																		
18. Tissue perfusion																		
19. Tissue/skin integrity																		
20. Urinary																		

* I = Improved, S = Stabilized, D = Deteriorated
** A = Assess, C = Direct care, T = Teach, M = Manage

Figure 11.1 (cont.)

PRELIMINARY HOME HEALTH CARE CLASSIFICATION METHOD
Assessment Instrument

Demographic variable	Yes	No	Cohort 1 score			Cohort 2 score			Cohort 3 score		
			Level of care			Level of care			Level of care		
			1	2	3	1	2	3	1	2	3
1. Age											
2. Male											
3. White											
4. Married											
5. Lives alone											
6. Self-care											
7. House											
8. Comprehends											
9. Communicates											
10. Pets in home											

Figure 11.2

HOME HEALTH CARE CLASSIFICATION METHOD
Coding Schemes

A. Home Health Care Components for Nursing Diagnoses and Nursing Interventions

1. Activity
2. Cardiac output
3. Cognitive
4. Coping
5. Digestive
6. Fluid
7. Health behavior
8. Injury/safety
9. Medication
10. Metabolic
11. Nutritional
12. Physical regulation
13. Respiratory
14. Role relationship
15. Self-concept
16. Self-care
17. Sensory
18. Tissue perfusion
19. Tissue/skin integrity
20. Urinary

B. Nursing Diagnoses Discharge Statuses

1. Resolved/improved
2. No change/stabilized
3. Worse/deteriorated

C. Types of Nursing Interventions

1. Assess
2. Direct Care
3. Teach
4. Manage

Figure 11.2 (cont.)

HOME HEALTH CARE CLASSIFICATION METHOD
Coding Schemes

D. Medical Diagnoses or Surgical Procedures

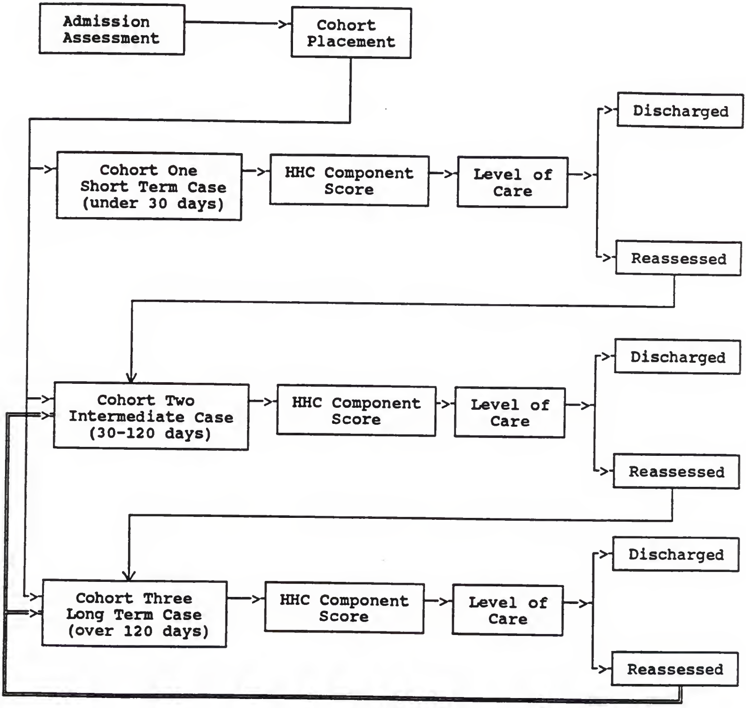
1. Operations: Nervous
2. Operations: Eye
3. Operations: Respiratory
4. Operations: Cardiovascular
5. Operations: Digestive
6. Operations: Urinary
7. Operations: Musculoskeletal
8. Operations: Integumentary
9. Infectious
10. Neoplasms
11. Endocrine
12. Nervous system
13. Circulatory
14. Respiratory
15. Digestive
16. Genitourinary
17. Skin
18. Musculoskeletal
19. Symptoms, signs
20. Injury, poison

E. Demographic Variables

1. Age
2. Male
3. White
4. Married
5. Lives alone
6. Self-care
7. House
8. Comprehends
9. Communicates
10. Pets in home

Figure 11.3

Home health care classification method example



12. SUMMARY

The significant findings described in this report provide a comprehensive understanding of this increasingly important health care delivery setting. They expand the information base needed for future Medicare policy decisions concerning home health services.

The findings, which are highly reliable, are based on a very large database which represents one of the largest collection of pertinent information collected on home health Medicare patients. The database consists of almost 9,000 patient records of cases with recent episodes of home health care. They were collected from a stratified national sample of 646 Medicare certified home health agencies.

This section summarizes the conclusions, limitations and recommendations based on this research. The findings led to four major conclusions, several outcomes and products. The limitations of the research project are also outlined and highlighted including the major problems encountered with the analysis of the data. Finally, the recommendations are provided including possible next steps.

Conclusions

Four major conclusions were derived from this research project. They address the objectives of the project which were to determine the variables critical for predicting resource requirements and measuring outcomes of home health care, and underscore their results. They focus on: (a) descriptive findings, (b) predictive findings, (c) cohort findings, and (d) the preliminary home health care classification method.

Descriptive Findings

The descriptive analysis strongly suggests that home health care for Medicare patients is administered by certified home health agencies (HHAs) that vary by staff size and type of ownership, and are found in all geographic locations. The HHAs offer an array of home health services with the major service being skilled nursing care. Home health nurses not only assess, provide nursing care, teach, but also manage the care of patients provided by a mix of other approved providers, namely home health aides, physical therapists, occupational therapists, speech therapists and medical social workers.

The Medicare patients being served are predominantly elderly, white, middle class females, married or widowed, living in their own homes with an available caregiver. Poor, disadvantaged, high risk patients were not represented among the sample patients. It is assumed that they are not served by home health agencies to any significant extent and may be cared for in skilled nursing facilities or similar types of institutions, or not served at all.

Predictive Findings

The predictive analyses demonstrated that home health care can be predicted reliably and that a home health classification system is feasible. The analyses identified that the most predictive measures of resource requirements were based on the length of the episode and the nursing care requirements of the patient.

The predictive analyses determined that the best method for predicting home health care requirements are based on the nursing diagnosis and nursing intervention home health care components. These are better predictors than functional status, medical diagnosis or surgical procedure. Demographics do have an impact on resource requirements and selected ones can be used to improve predictions when used in combination with nursing diagnosis or nursing intervention components.

Cohort Findings

The length of the episodes of care was determined to be highly significant. Almost fifty percent of all patients had episodes of under thirty (30) days duration, whereas the remaining fifty percent represented other patterns of episodes of care.

These findings led to the development of the three cohorts based on the length of the episode in days: (a) short term, acute care cases of under 30 days, (b) intermediate care cases of 30 to 120 days, and (c) long term, chronic care cases of over 120 days. The number of visits during the first thirty (30) days was significantly lower for the short term acute care cases than for the intermediate or long term cases.

Home Health Care Classification Method

A preliminary Home Health Care Classification Method, based on the findings of this research using a nursing model, was developed. It combines the length of the episode, using the three cohorts based on the length of the episode in days, with nursing care requirements of a patient.

The length of the episode consists of three cohorts: (a) short term cases of under 30 days, (b) intermediate cases of 30 to 120 days, and (c) long term cases of over 120 days requiring home health care.

The nursing care requirements for each of the three cohorts are based on five types of assessment data: (a) ten demographic variables, (b) twenty (20) nursing diagnosis home health care components, (c) measures of outcomes Identified by three discharge status goals, (d) twenty (20) nursing intervention home health care components, and (e) four types of nursing intervention actions.

The classification method requires a specially designed Assessment Instrument which is used to assess, classify and predict the care requirements In terms of numbers of home visits. Patients, on admission to home health care, are placed into one of three cohorts: (a) short term case, (b) intermediate case, or (c) long term case. Patients are assessed using the twenty (20) home health care components scheme to identify nursing diagnoses, discharge statuses expected outcomes, nursing interventions, and types of nursing actions. They are then scored for three levels of care for each of the three cohorts. The scores will serve to predict the average number of home visits required.

Home Health Care Tools

This research also produced several tools for the home health care industry. They include the schemes that were specifically developed to code and analyze the narrative descriptions for: (a) ten demographic variables, (b) list of one hundred forty-seven (147) nursing diagnoses, (c) list of three discharge statuses as measures of expected outcomes, (d) list of one hundred sixty-six (166) nursing interventions, and (e) list of four types of nursing actions. These schemes were found to be the most useful classification variables that predict resource requirements.

In addition, the scheme of twenty (20) home health care components which is critical to the classification method has potential for the industry. The scheme can be used to link nursing diagnoses and nursing interventions to each other. It can be used for more efficient documentation of the home health care, for other research studies, and in the design of home health computer systems.

This classification method with these new tools could be used as a basis for a prospective payment system for home health care Medicare patients. It encompasses the scheme of twenty (20) home health care components which could also be used for reimbursement like the DRGs in hospital settings.

Limitations of this Study.

This study collected retrospective data on discharged patients for entire episodes of home health care. As a result many of the assumptions were not accurate and many of the data elements collected were not valid because of the varying nature of the home health agencies.

The major limitation was the use of retrospective data from which predictions were made on resource requirements and outcomes of care. Summary data was abstracted from patient records for an entire episode of home health care resulting in assumptions being made based on cumulative data. This limitation made it impossible to collect initial assessment data, track the care process or audit the changes in patient status.

Secondly, the lack of standardized schemes for coding the four categories of assessment variables which were collected primarily as narrative text: (a) nursing diagnoses, (b) expected outcomes, (c) nursing interventions and (d) type of interventions. The narrative text consisted of approximately 40,000 nursing diagnoses and patient problems including their outcomes of care or discharge status as well as almost 80,000 nursing interventions and types of interventions provided during the 9,000 episodes of home health care.

These were further complicated because: (a) trained abstractors were not used to collect the data, (b) questioning the primary nurse providers for items not documented in the patient's record was considered subjective, (c) home health agency records, from which the data were collected, were not uniform since the patient records varied from agency to agency , and (d) summary data for a patient's episode of home health care were not precise enough to analyze individual visits.

These limitations led to varying interpretations of length of an episode of home health care. Retrospective data on hospitalizations preceding and occurring during episodes of home care were also inconsistently recorded by different agencies. And finally, it was not possible to collect time and cost of visit data which are critical to predicting resource use.

Other limitations, with recommendations for future study, are described below.

Problems with Retrospective Data

The use of retrospective data prevented detailed study of individual nursing diagnoses assessed and nursing interventions provided for each home visit. A prospective study collecting data on Individual visits could supply such data.

Problems with Summary Data

The data on the Abstract Form provided a cross-sectional summary of all events in the entire case and did not include changes in the patient's condition at different times during the episode of care. It also did not provide an accurate assessment of the patient's status on admission to home health care.

Disparity Between the National Sample Agencies and Sample Cases

The large number of agencies with a small number of cases prevented detailed study of the impact of agency characteristics on the patients served. An in depth study of a larger number of cases from a smaller number of home health agencies would permit addressing additional research issues pertaining to agency characteristics.

Problems with Admission and Discharge Data

Different agencies followed different procedures to identify the dates of admission and discharge from home. For consistency, the dates of the first and last visit were used to measure the length of the episode of care.

Problems with Retrospective Coding of Narrative Nursing Diagnoses and Nursing Interventions

The two schemes used for nursing diagnoses and nursing interventions were probably the most important outcomes of this study, but were limited by the nature of the narrative text provided by the agencies. Some agencies did not record comparable detail for nursing diagnoses and nursing interventions. When the coding schemes which have been developed are applied prospectively at the time of the visit, there will be more complete recording, better mapping and greater agreement between nursing diagnoses and nursing interventions.

Large Number of Variables in Regression Models

When large numbers of variables are used in a single regression model (such as the 88 independent variables in the nursing intervention by type of intervention model), there is a danger that spurious statistical significance will be obtained especially at a $p \leq .05$ level. Large numbers of variables also require large samples especially when the frequency of some events is low. The analyses based on the twenty (20) nursing diagnosis and nursing intervention home health care (HHC) components, however were very usable.

Using Resource Use to Predict Resource Requirements

All of the prediction models and cohort analyses are based on measures of actual visits or resource use. It was assumed that these variables accurately reflected resource requirements for care. However, actual use may be influenced by other factors including reimbursement policies or constraints on personnel or other constraints on the ability of an agency to provide care.

Limitations of Hospital Episode Data

The items on the Abstract Form dealing with hospital episodes prior to or during an episode of home health care were misinterpreted by some agencies, answered inaccurately by others, and may have been inadequate to address very complex cases. These problems limited an accurate analysis of hospital episodes occurring during episodes of care for the entire study population. Medicare claims records would provide an adequate solution to this problem when matched with the sample cases. This would also permit verifying visit counts and providing actual cost data for the episode of home health care.

Need to Test the Models with a Prospective Study

The best approach to addressing the limitations of this study is to conduct a prospective study using a refined assessment instrument and classification method using the nursing diagnosis and intervention coding schemes based on the results of the present study. A prospective study is the only way to accurately and independently validate the prediction models tested in this study.

Recommendations

Notwithstanding the limitations of this study, several recommendations clearly emerged from this research as well as other recommendations which addressed the need for further analysis on the study data and still others which identified the need for additional research. They included:

- The preliminary **Home Health Care Classification** (HHCC) method based on a nursing **model**, could predict resource requirements reliably, be clinically sound and statistically significant.

- The HHCC method could use an **Assessment Instrument** consisting of four factors that assess the patient care requirements needed to predict the resource requirements: (a) nursing assessment, (b) medical assessment, (c) functional assessment, and (d) socio-demographic assessment.

- The nursing assessment based on the **20 components of home health care** could form the basis for predicting resource requirements. The variables -- nursing diagnoses, expected outcomes, nursing interventions and type of interventions -- could provide the framework for the nursing model.

- The HHCC method could predict resource requirements separately for each of **three patient cohorts** based on the type of case -- short term, intermediate and long term -- and based on expected length of the episodes of care. Different methods would be used to predict resource requirements for the first thirty days for each type of case as well as for the intermediate and long term cases for the rest of a case if and when the case exceeds 30 days.

- The **coding schemes** developed for nursing diagnoses, expected outcomes, nursing interventions and type of nursing interventions could not only enhance the patient record and the documentation of patient care but also, expand the existing HCFA coding scheme of nursing treatments used for completing the HCFA forms -- 485 and 486.

- The HHCC based on a nursing model could predict resource requirements and used for reimbursement and/or a framework for a home health care prospective payment system. The level of reimbursement could be made using different fees for each of the three types of cases for the three cohorts. The highest level could be for the first 30 days of an episode adjusting for each of the three types of cases, followed by the next highest level for the second cohort and the smallest level for the third cohort.

- The **study data** could be linked to Medicare claims data on hospital and long term care episodes for cases included in the current study to enhance the understanding of resource use for home health care patients. Cost data on each case were not available and not included in the analysis. Such analysis could also expand the existing information about the cost of an episode of home health care by agency size, type of ownership, and geographic location, for specific patient's conditions.

- Further analysis on the **visit data**–mix of skilled nursing and home health aide visits and on the home health aide visit alone in the first thirty days and total episode of care could show relationships between these two types of provider visits. These visits are different for the three cohorts and appear to relate differently with nursing diagnoses and nursing interventions than nursing visits alone.

- Further analysis on nursing **care data**–nursing diagnoses and nursing interventions and their groupings of home health care components could determine the clusters of conditions and care requirements that relate to each other. This type analysis was not attempted in the study, but the findings showed definite relationships between these two variables.

- A **prospective research study** based on the methods derived from this study could be carried out to refine, test and evaluate the preliminary Home Health Care Classification method and Assessment Instrument; to test the predictive models; and to generate additional data needed to elucidate the three cohort model.

- A **prospective research study** could include periodic patient assessments, data collection on nursing diagnoses, nursing interventions, and the expected outcomes (goals) of care for each home visit. The nursing assessment variables could be analyzed to determine the relationships between nursing diagnoses and nursing interventions and whether they provide a new type of case-mix algorithms.

- A prospective research study could also be expanded to investigate the services of other providers not studied in detail. The services include: physical therapy, speech therapy, occupational therapy, home health aide, and medical social services.

- A prospective research study could develop a prospective payment system for home health care using a nursing model. It could be based on the nursing care requirements of patients based on the nursing diagnosis and intervention home health care components and on the three cohort model. Such a system could improve the efficiency of home health care reimbursement as well as influence cost containment policy for the industry.

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3. REVIEW OF THE LITERATURE

Appendix 3.1

3.1A HCFA Form 485: Home Health Certification and Plan of Treatment

3.1B HCFA Form 486: Medical Update and Patient Information

3.1C HCFA Form 487: Plan of Treatment/Medical Update and Patient Information

ARTMENT OF HEALTH AND HUMAN SERVICES
LTH CARE FINANCING ADMINISTRATION

MEDICAL UPDATE AND PATIENT INFORMATION

Patient's Name

2. HIC No

3. Sex ☐ M ☐ F

4 Date of Birth

5. Medicare Covered? ☐ Yes ☐ No

6. Period Covered or Certification Period From: Through:

7. Provider Name and Number

8. Place of Treatment, If Other than Home (Name and Address)

9. Are services related to any accident or employment related injury? ☐ Yes ☐ No

10. Date and Reason Agency Last Contacted Physician

11. Is the patient receiving additional medically reasonable and necessary skilled care pursuant to a Physician's Plan of Treatment paid for by other than Medicare? ☐ Yes (Specify) ☐ No

12. Dates of Last Inpatient Stay From: To:

Type of Facility

13. Date Physician Last Saw Patient

14. SPECIFIC SERVICES AND TREATMENTS (CODES ON REVERSE)

TOTAL VISITS	SERVICES	SPECIFIC TREATMENT ORDERS	FREQUENCY AND DURATION	TX CODE

15. Updated Information: New Orders/Treatments/Clinical Facts

16. Functional Limitations/Rehabilition Potential/Goals (Each Discipline)

17. HOMEBOUND

A. Reason Homebound - Narrative:

B. Indicate any times when Home Health Agency made a visit and the patient was not home and reason why if ascertainable

C. Specify any known medical and/or non-medical reasons the patient regularly leaves home and frequency of occurrence

18. Is there an available, able and willing care giver? ☐ Yes (Specify) ☐ No

19. Unusual Home/Social Enviornment

20. Does your Agency have any supplementary plans of treatment on file from a physician other than the referring physician or from other specialists for care being given the patient by your agency? ☐ Yes ☐ No If Yes, Please explain briefly.

21. Other DME Available for Use

22. Signature of Nurse or Therapist Completing or Reviewing Form

Date

DEPARTMENT OF HEALTH AND HUMAN SERVICES
HEALTH CARE FINANCING ADMINISTRATION

Appendix [illegible].1A HCFA Form 485

HOME HEALTH CERTIFICATION AND PLAN OF TREATMENT

1. Patient's Name and Address

2. Patient's HI Claim Number

3. Medical Record Number

4. Dates: Start of care and verbal order for SOC

5. Certification Period:
From: To:

6. Home Health Agency Name and Address

7. Principal Diagnosis: Narrative, Dates of Onset/Exacerbation, ICD-9-CM Code
☐☐☐.☐☐

8. Surgical Procedure(s) Relevant to Care: Narrative, Date, ICD-9-CM Code
☐☐☐.☐☐

9. Other Pertinent Diagnosis — Narrative, Dates of Onset/Exacerbation, ICD-9-CM Code(s)
☐☐☐.☐☐
☐☐☐.☐☐
☐☐☐.☐☐
☐☐☐.☐☐

10.

Functional Limitations

☐ Amputation
☐ Bowel/Bladder (incontinence)
☐ Contracture
☐ Hearing
☐ Paralysis
☐ Endurance
☐ Ambulation
☐ Mental
☐ Speech
☐ Vision
☐ Respiratory
☐ Other (Specify)

Activities Permitted

☐ Bedrest
  ☐ Complete
  ☐ BRP
☐ Up as tolerated
☐ Transfer Bed/Chair
☐ Exercises Prescribed
☐ Partial Weight Bearing
☐ Independent at Home
☐ Crutches
☐ Cane
☐ Wheelchair
☐ Walker
☐ No Restrictions
☐ Other (Specify)

11. Safety Measures:

12. Orders for Services and Treatments (Specify modality, amt/freq/dura)

13. Medications: Dose/Frequency/Route (N) New (C) Changed

14. Mental Status: ☐ Oriented ☐ Forgetful ☐ Disoriented ☐ Agitated ☐ Comatose ☐ Depressed ☐ Lethargic ☐ Other

15. Nutritional Requirements:

16. Medical Supplies & DME Ordered

17. Allergies

18. Goals/Rehabilitation Potential/Discharge Plans

19. Significant Clinical Findings/Summary from each discipline

20. Prognosis: ☐ Poor ☐ Guarded ☐ Fair ☐ Good ☐ Excellent

21. Attending Physician's Name and Address

22. PHYSICIAN CERTIFICATION:

I ☐ certify ☐ recertify that the above home health services are required and are authorized by me with a written plan for treatment which will be periodically reviewed by me. This patient is under my care, is confined to his home, and is in need of intermittent skilled nursing care and/or physical or speech therapy or has been furnished home health services based on such a need and no longer has a need for such care or therapy, but continues to need occupational therapy.

23. Attending Physician's Signature and Date

DEPARTMENT OF HEALTH AND HUMAN SERVICES
HEALTH CARE FINANCING ADMINISTRATION

PLAN OF TREATMENT/MEDICAL UPDATE AND PATIENT INFORMATION ADDENDUM

1. Patient's Name

2. Patient's HI Claim Number

3. Provider Number

4. Period Covered
From: To:

CERTIFICATION/PLAN OF TREATMENT *(CONTINUED)*	MEDICAL UPDATE/PATIENT INFORMATION *(CONTINUED)*

Form HCFA-487(C4) (4-85)

1 - PROVIDER

4. RESEARCH AND DEMONSTRATION METHODOLOGY

Appendix 4.1

4.1A Selection of Sample Agencies

4.1B Survey of Home Health Agencies Estimation of Population Total

4.1C Sample Design for Home Health Study

II. PATIENT ADMISSION DATA

INDICATE admission data to Home Health Agency for services for most recent Episode of Care. ***[ENTER date of first visit to patient]***

9. Admission Date: ☐☐ ☐☐ ☐☐
Month Day Year

____ 10. Patient Admission Status:
[ENTER one code]

- (1) New Admission—New to Agency
- (2) Re-admission—Previously Known to Agency

III. PATIENT SOCIO-DEMOGRAPHIC DATA

INDICATE socio-demographic data about patient at site where services are provided. ***[ENTER one code number, found in parenthesis ( ), for each question unless otherwise specified]***

11. Date of Birth: ☐☐ ☐☐ ☐☐☐☐
Month Day Year

____ 12. Sex:

- (1) Male
- (2) Female

____ 13. Race/Ethnic Group:

- (1) White/not Hispanic
- (2) Black/not Hispanic
- (3) Hispanic
- (4) Asian/Pacific Islander
- (5) American Indian/Alaskan Native
- (9) Unknown

____ 14. Marital Status on Admission:

- (1) Never Married
- (2) Married
- (3) Widowed
- (4) Separated
- (5) Divorced
- (9) Unknown

____ 15. Living Arrangements:

- (1) Alone
- (2) Spouse Only
- (3) Spouse and/or Children
- (4) Family or Relative(s)
- (5) Non-relative(s)
- (9) Unknown

____ 16. Available Primary Caregiver:

- (1) Self
- (2) Spouse Only
- (3) Informal/Not Paid: Family, Relative(s), or Friend(s)
- (4) Formal/Paid: Community Agency or Living in a Personal Care Home
- (9) Unknown

GEORGETOWN UNIVERSITY
School of Nursing

Home Care Classification Project

SELECTION OF SAMPLE AGENCIES

Isadore Enger
Feb. 9, 1988

1.0 INTRODUCTION

To meet the objectives of the Project, information will be collected from a sample of Medicare patients served by home health agencies. It is impractical to select the patients in a strict random manner. Even if a list of the entire population of patients existed in a readily usable format, the sample would be spread across such a large number of agencies that the costs of contacting each agency would be prohibitive. A two-stage design was adopted, therefore of first selecting a sample of agencies and then selecting a sample of patients within each agency. The selection of agencies has been completed and the procedures and results are presented here for samples of 200, 300, and 400 agencies. Three samples were selected because no final decision has been made concerning the exact number. The procedure in each set was to divide the universe of agencies from which the samples were to be drawn into 16 strata according to type of agency (VNA, Official, Hospital-Based, and Private) and location in the U. S. (North, South, MidWest, West). The number of agencies selected from each stratum was made proportional to size of strata where size was measured by the number of full-time-equivalent registered nurses (RN's) employed. Within each stratum, agencies were selected with probability proportional to agency size with the exception of 28 large agencies, over 100 RN's, which were automatically included in each of the three samples. Since some agencies may be unable or decline to participate in the study, five matching agencies were identified for each non-large agency in all three sets. A "match" was defined as being in the same stratum and close in size to the agency selected. Because of the large volume of data on agencies selected and their matches, the results were placed onto a computer floppy disk. A description of the disk is given in the Appendix. The final selection presents some ideas on selection of patients to assist Project management in determining which procedure to adopt.

2.0 DESIGN FACTORS

The development of an efficient design must take into account the objectives of the Project, amount of funds available, logistical problems, time limitations, availability of information concerning the universe of agencies from which the sample is to be selected, and knowledge of the subject-matter of delivery of home health care to Medicare beneficiaries. Based on these considerations as well as the initial design characteristics described in the grant application for the Project, four factors were deemed to be important in selecting agencies to be included in the samples: number of agencies, size, type of agency, and location. They are discussed in turn below.

2.1 Number of Agencies

The Health Care Financing Agency (HCFA) provided the Project with a computer tape containing information on 5880 agencies certified in 1986 to receive reimbursement for home health care services. Some 113 very small agencies, those with less than one RN, were deleted because they were judged not to provide professional services directly to patients but rather were organized for purposes of meeting regulatory requirements. The remaining 4767 agencies comprise the universe from which the three samples were selected.

The grant application specified 100 patients in each of 100 agencies for a total of 10,000 patients. The agencies would be responsible for collecting much of the patient data, rather than the Project, and subsequent investigation indicated that some of the smaller agencies might not be able to provide data for 100 patients. It was decided, therefore, to increase the number of agencies and to reduce the number of patients, at least for some agencies. The exact figures have not been determined and, in fact, one of the objectives of this memorandum is to provide information for making these decisions. Values of 200, 300, and 400 agencies were assumed to be reasonable.

2.2 Measure of Size

Ideal measures of size would be the amount of services provided to Medicare beneficiaries by an agency or the number of beneficiaries served. Such data were not available on the HCFA tape but it was judged that the number of full-time-equivalent registered nurses employed by an agency, which was available would offer an excellent substitute.

2.3 Type of Facility

HCFA assigned a facility "type" to each agency as follows:

1. Visiting Nurse Association
2. Combined government and voluntary agency
3. Official health agency
4. Rehabilitation facility based program
5. Hospital based program
6. Skilled Nursing Facility based program
7. Proprietary
8. Private non-profit

The eight types were collapsed to four based upon judgment concerning differences in organizational structure, modes of operation, types and mix of personnel, etc. In addition, some of the types contained too few agencies for a meaningful sample to be drawn (e.g. Rehab-based with only 34 agencies). The final four types were:

1. Visiting Nurse Association (type 1. above by itself)
2. Official (types 2. and 3. above)
3 Hospital-based (types 4., 5., and 6.)

2.4 Location

Agency location was denoted on the tape by the location of the Health and Human Services regional office supervising the agency as follow:

01 Boston

02 New York

03 Philadelphia

04 Atlanta

05 Chicago

06 Dallas

07 Kansas City

08 Denver

09 San Francisco

Considering the number of agencies to be sampled and the need for stratification by type as well as location, it was decided to aggregate the ten regions into four divisions similar to those of the U. S. Census Bureau. Regions 01, 02, and 03 were combined to form North, 04 and 06 are South, 05 and 07 are Midwest, and 08 and 09 are West. The map (see Figure 1) [redacted] shows the divisions.

3.0 SELECTION OF SAMPLE AGENCIES

Use of the four factors to select the sample of agencies is discussed in this section.

3.1 Number of Agencies

As described in section 2.1 above, the number of agencies to be included in the sample was taken into account by selecting independent samples of 200, 300, and 400 agencies. The procedures and computer programs are available for selecting other samples if Project management chooses a different value.

3.2 Size

The size factor is considered before the other two factors because it affects their use in selecting samples. Table 1 shows large variations in size, with, for example, the 1.1 percent of the agencies with the largest size, 65 RN's and over, employing 20.5 percent of the RN's. To account for this variation, agencies were selected with probability proportional to size, with large agencies having a higher probability of being selected than small ones.

There is one complicating feature of PPs sampling that needs to be addressed before proceeding to the other two factors. Samples are drawn to extrapolate their results to the universe. Extrapolation for some universe parameters cannot be accomplished if an agency in the sample is "large". An agency is considered to be large whenever

$$m \ Na / N > 1 \qquad (1)$$

where m = number of agencies in the sample

Na = size of agency a

N = total number of RN's in the universe

Substituting $m = 400$ and $N = 43{,}175.50$ into (1) gives $Na > 107.9$. This last figure was rounded down to 100 to be conservative since the number of RN's is a proxy for a true measure of size (e.g. the number of patients). Another reason for rounding down is that equation (1) should hold for some variables other than size. The values of such variables are unknown since one of the reasons for taking the survey is to measure them. In any event, it is well to be conservative in defining "large". There were 28 agencies with more than 100

RN's and these agencies employed 6,017.75 RN's, or 13.94 percent, of the 4,3175.50 RN's in the entire universe. The 28 agencies were automatically included in all three samples. The remaining 172, 272, and 372 agencies, respectively, were selected from the remaining 5,739 agencies in the universe which employed 86.04 percent (37,157.75) of the RN's.

3.3 Type and Location

The type and region factors each have four categories. They were taken into account by dividing the non-large universe of 5,739 agencies into sixteen strata defined by the two factors (i. e., VNA-North, ... , Private-South). The number of agencies to be selected from each stratum was made proportional to the size of the stratum as follows. First, the proportion of RN's working for the agencies within a stratum by the total number of RN's (37,157.75). The resulting 16 proportions were then multiplied by 172, 272, and 372 and these products were rounded and adjusted, never by more than a fraction of one, to ensure that their sums over all strata did in fact equal the required totals. In addition, their marginal sums (e.g., for one type summed over four regions) had to sum to the proper totals.

Tables 2, 3, and 4 show the initial data and final results. Table 2 gives the distribution of agencies across the 16 strata. The first value in each cell is the number of agencies in the universe (after exclusion of the 113 very small agencies); the second value is the number of large agencies; and the third is the number of non-large agencies from which the samples were drawn.

Table 3 is a similar distribution of the number of RN's. In addition, the fourth values in each cell are the proportions described in the previous paragraph. Table 4 lists the number of agencies sampled in each stratum for each of the three samples.

3.4 Methodology for Selection Within Strata

The agencies were selected with probability proportional to size. The 44 agencies in the VNA-North stratum to be selected from the universe total of 277 agencies in that stratum serve to illustrate the procedure. The number of RN's in each of the 277 was divided by the total number of RN's in the stratum, 4,393.25. The 277 agencies were not arrayed in any particular order. The resulting 277 proportions were cumulated to obtain running sums. As an example, the first five had proportions of .0075, .0022, .0030, .0048, and .0030. The cumulated sums were .0075, .0097, .0127, .0175, and .0205. Random numbers between zero and one were generated by computer and, for each number, the agency selected was the first one whose cumulated sum equalled or exceeded the random number. A random number of .0153 would result in the fourth agency being selected. The process was repeated until 44 different agencies were selected.

It is important to note that the process, which is termed sampling with replacement, can, and did, result in the same agency being selected more than once. The 44 different selections were achieved only after 53 random selections; one agency was selected three times and seven others twice each. There are several ways of adjusting for multiple choices. One is to request data for additional patients from agencies selected more than once. This solution is not considered to be feasible since it would place an unfair burden upon some agencies and also would result in a total sample of patients exceeding 10,000 by a considerable margin. A second solution is to use only those agencies selected with the first 44 random numbers. Again this is not a feasible solution because the number of agencies would be too small. A third solution is to weight each agency's data by the number of times the agency was selected. A fourth solution is to ignore the multiple selections (i.e., do not weight). This last solution would result in the smaller agencies being over-represented in the sample. It should still be considered, however, along with the third one, because Thornberry (1) compared, weighted, and unweighted extrapolation of results of the Health Interview Survey to the population of the U. S. and, for certain parameters, obtained almost identical results. It is suggested that after the data are collected a few analyses be made both ways before making a final decision.

For all three samples, the provider numbers of the selected agencies have been placed onto a computer floppy disk along with the number of times each agency was included in the sample.

3.5 Replacement of Agencies Declining to Participate

It is possible, perhaps likely, that a number of sample agencies will decline to participate in the survey. It is suggested that in these cases a "matching" agency be substituted where a "match" is defined as being in the same stratum, close in size to the one selected, and not in the sample. Using these three rules, five matching agencies were identified for each sample agency. The matching was done independently, so it is possible that the same match could appear for two or more sample agencies. Such repetition presents no real problem but needs to be considered when making substitutions. The provider numbers for the matching agencies are contained on the computer disk described in the Appendix.

4.0 SAMPLING OF PATIENTS

Decisions will need to be made to determine the number of patients to be selected from each sample agency. The ideal situation is to choose the numbers in such a manner that every patient in the universe has an equal probability of being included in the sample and the total number is 10,000. This ideal cannot be realized completely but can be approximated rather well. For the large agencies, select the numbers proportional to the size of agency. As discussed in Section 3.2, the large agencies employ 6,017.75 of the total of 43175.50 in the universe. Therefore, 6,017.75/43,175.50 of the sample of 10,000 patients should come from these agencies, or 1,394 patients. The number from the a-th agency would be 10,000 N /43,175.50, where N is the number of RN's in that agency. An equal number of patients would be selected from each of the remaining agencies because these agencies were selected with probability pro-portional to size. For the sample of 200 agencies, the number would be 8,606/172 or 50 to 51 (8,606 is 10,000 minus the number of patients in the large agencies and 172 is 200 minus the 28 large agencies automatically included in the sample). Samples of 300 and 400 would result in 31 to 32 patients and 23 to 24, respectively.

The above approximation to the ideal may not be realizable, nor even desirable, because of cost and logistical factors which have not been considered up to this point. The choice of the number of agencies to be sampled and the number of patients within agencies is dependent upon balancing the burden placed upon Project staff in interacting with agencies and the ability of some agencies to provide data for the requisite number of patients. One possible solution is to relax the restriction that the same number of patients be sampled in each non-large agency. As an example, 25, 50, and 75 patients could be sampled in small, medium, and near-large agencies. Doing so would destroy the approximate equal probability of selection of patients by selecting too many patients from the near-large agencies and too few from the small ones. Weights can be applied to take into account such disproportionate sampling. Such procedures are not uncommon in practice because a large number of cases can sometimes be sampled for the same costs. The increase in cases often results in greater precision of estimates of universe parameters even though the precision of the ideal procedure is better for the same number of cases.

(1) Thornberry, Owen T. An Experimental Comparison of Telephone and Personal Health Interview Survey. Series 2, No. 106, National Center for Health Statistics, 1987, Appendix I.

APPENDIX A
DESCRIPTION OF DISK

A.1 Format of Disk

The disk is double-sided, double density and was formatted with DOS on an IBM XT. There are 14 files as indicated in the DOS DIRectory on the next page. Files with DBF extensions are dBase III data files; those with ASC extensions are ASCII files copied from the DBF files using the DELIMITED option. All data in the ASC files are numeric with comma delimiters and an end-of-record mark at-the-end of each record.

A.2 SLCTXXX.DBF Files

The four SLCTXXX.DBF files contain data for the four samples of 172, 272, 372, and 28 agencies. The number of records in each file is equal to the number of agencies. There are 14 variables in each file as indicated on the next page. The variables of interest are as follows:

PROVNO	Provider number
FACILITY	Initial type of facility, integers 1 thru 8 as described in Section 2.3
REGION	HHS Regional office; integers 1 thru 10 as described in Section 2.4
RNS	Number of full-time-equivalent registered nurses
FACCOMB	Type of facility, integers 1 thru 4 as described in Section 2.3
REGCOMB	U. S. Census Division, integers 1 thru 4 as described in Section 2.4
RNSCOMB	Categorization of RNS into four classes as described in Table 1
DUMMY1	Except for SLCT28.DBF, an integer giving the order in

which each agency was selected within its stratum.

DUMMY2 For SLCT28.DBF, the number of patients to be sampled
Number of times agency was selected to be in sample

DUMMIES 3, 4, 5, 6 - Not relevant

A.3 SLCTXXX.ASC Files

Six fields copied from the corresponding SLCTXXX.DBF files as follows: PROVNO, ZIP, RNS, FACCOMB, REGCOMB, and DUMMY2. The SLCT28.ASC file has DUMMY1 instead of DUMMY2.

A4. MTCHXXX.DBF Files

There are eleven variables in each of the three MTCHXXX.DBF files containing provider numbers of the matching agencies. There is no MTCH28.DBF file because none of the large agencies was matched. The first four variables, PROVNO, RNS, FACCOMB, and REGCOMB are the same as the corresponding SLCTXXX.DBF file. The five MTCHX variables are provider numbers of matching agencies arrayed in order of nearness, in terms of RNS, to the selected agency.

A.5 MTCHXXX.ASC Files

These three files were copied from their corresponding MTCHXXX.DBF files. Each record consists of provider numbers of the selected agency and its five matches.

Table 1: Percent Frequency Distribution of Number of Agencies and Number of RN's by Size of Agency.

Agency Staff Size	Certified Agencies		Full-Time RN's	
	#	%	#	%
1 to <5 RN's		60.9		20.1
5 to <14		28.5		29.2
14 to <65		9.4		30.2
65 and over		1.1		20.5

Table 2: Number of Home Health Agencies in Universe by Type Region and by Full-Time Equivalent Registered Nurses by Groupings.*

TYPE	RN SIZE*	REGION				TOTAL
		North	South	MidWest	West	
VNA	1	288	43	105	61	497
	2	11	0	3	1	15
	3	277	43	102	60	482
OFFICIAL	1	186	450	445	102	1,183
	2	1	3	1	0	5
	3	185	447	444	102	1,178
HOSP-BASED	1	287	449	451	315	1,502
	2	1	0	2	0	3
	3	286	449	449	315	1,499
PRIVATE	1	438	1,108	674	365	2,585
	2	0	1	4	0	5
	3	438	1,107	670	365	2,580
TOTAL	1	1,199	2,050	1,675	843	5,767
	2	13	4	10	1	28
	3	118	2,046	1,665	842	5,739

*Full-Time Equivalent RN's
1 = Total > 1.00 RN
2 = Number with > 100 RN's
3 = Number with > 1.00 and < 100 RN's

GTU Table 3. Number of Full-Time Equivalent RN's in Universe of Home Health Agencies by Type by Location

AGENCY TYPE	RNs*	REGION				TOTAL
		North	South	Midwest	West	
VNA	1	6047.00	617.00	2444.25	1014.25	10122.25
	2	1653.75	0	826.50	103.00	2583.25
	3	4393.25	617.00	1617.75	911.25	7539.25
	4	11.82	1.66	4.35	2.45	20.29
HD	1	2454.75	3101.00	3531.50	610.50	9697.75
	2	190.00	869.00	925.00	0	1984.00
	3	2264.75	2232.00	2606.50	610.50	7713.75
	4	6.09	6.01	7.01	1.64	20.76
HOSP-BASED	1	2427.50	1787.75	2683.50	1447.25	8346.00
	2	167.00	0	542.00	0	709.00
	3	2260.50	1787.75	2141.00	1447.25	7637.00
	4	6.08	4.81	5.76	3.89	20.55
PROP	1	2735.75	6246.75	4383.50	1643.25	15009.25
	2	0	101.50	640.00	0	741.50
	3	2735.75	6145.25	3743.50	1643.25	14267.75
	4	7.36	16.54	10.07	4.42	38.40
TOTAL	1	13665.00	11752.50	13042.75	4715.25	43175.50
	2	2010.75	970.50	2933.50	103.00	6017.75
	3	11654.25	10782.00	10109.25	4612.25	37157.75
	4	31.36	29.01	27.21	12.41	100.00

*Full-Time Equivalent RNs
1. Total of Agencies with > 1.00 RN
2. Number of Agencies with > 100 RN's
3. Number of Agencies with > 1.00 and < 100 RN's
4. Percent of last number above to Grand Total

Table 4: Number of Home Health Agencies with >1.00 and <100 RN's to be Included in Sample by Type by Location.

TYPE	SAMPLE SIZE	REGION				TOTAL
		North	South	MidWest	West	
VNA	172 272 372	21 32 44	4 ~~3~~ 5 6	7 ~~105~~ 12 17	4 ~~61~~ 7 9	35 56 76
OFFICIAL	172 272 372	10 17 23	11 16 22	12 19 26	3 4 6	36 56 77
HOSP-BASED	172 272 372	10 16 23	8 13 18	10 16 21	7 11 14	35 56 76
PRIVATE	172 272 372	13 20 27	28 45 62	17 27 37	8 12 17	66 104 143
TOTAL	172 272 372	54 85 117	50 79 108	46 74 101	22 34 46	172 272 372

GEORGETOWN UNIVERSITY
School of Nursing

Home Care Classification Project

SURVEY OF HOME HEALTH AGENCIES
ESTIMATION OF POPULATION TOTAL

Isadore Enger
March 2, 1988

1.0 INTRODUCTION

The data collected during the survey of home health agencies will be subjected to detailed analysis employing a variety of statistical techniques. The goal will be to measure relationships between services provided to Medicare beneficiaries and characteristics of the agencies and beneficiaries. The sample results will be extrapolated to the population of home health agencies. The accuracy of such estimates is quite important but cannot be determined until the data are collected and analyzed. At this time, however, a useful first step was possible. The accuracy of two standard statistical methods of extrapolation, known as ratio and prediction estimation, respectively, was tested by making estimates of the total number of health aides employed by all agencies in the population and comparing the estimates with the known total. Although the number of health aides may not be of intrinsic interest, it was the only variable for which data were available for all agencies.

As described in a previous report (1), samples of 200, 300, and 400 agencies were obtained from the population of 5767 agencies. The same 28 large agencies, those with number of RN's exceeding 100, were automatically included in each of the three samples for reasons given in (1). No extrapolation was required for these agencies; their known total of health aides would simply be added to any estimate for the 5739 non-large agencies. The problem, therefore, is to make such estimates.

Three samples of 172, 272, and 372 agencies were drawn independently from the population of 5739 agencies with probability proportional to size as measured by the number of full-time-equivalent registered nurses working for the agency. Agencies were selected with replacement so that some agencies were selected more than once, specifically there were 177, 296, and 405 draws. The two estimation methods were applied to each sample and the resulting estimates were compared with the known total of 25,545 health aides. The two estimation methods are described in section 2.0 and the results are given in section 3.0.

2.0 METHODS OF ESTIMATION

2.1 Ratio

Let $x_1, x_2, \ldots x_{5739}$ be the size values, the number of RN's, for the 5739 agencies in the population. The samples were formed from n independent draws, at each of which the i-th agency in the population was selected with probability

$$Pi = X_i/X \qquad (1)$$

where

$$X = X_1 + \ldots + X_{5739} \qquad (2)$$

Let $Y_1, Y_2, \ldots Y_{5739}$ be the number of health aides. The ratio estimator of the population total

$$Y = Y_1 + \ldots + Y_{5739} \qquad (3)$$

is [2]

$$\hat{Y}_R = \frac{1}{n} \sum_{i=1}^{n} Y_i/Pi \qquad (4)$$

Each ratio, yi/Pi, is, in itself, a ratio estimate of the population total, Y. This can be seen by substituting for P_i giving $(X/x_i)\ y_i$. In words, the number of health aides in agency i is inflated to an estimate of the population total by multiplication by the ratio of the total number of RN's in the population to the number of RN's in the agency. The ratio estimate, equation (4) is the average of such individual estimates across all draws.

The estimated variance of the population estimate is (2)

$$\hat{V}(\hat{Y}_R) = \frac{1}{n(n1)} \sum_{i=1}^{n} \left(\frac{y_i}{p_i} - \hat{Y}_R\right)^2 \qquad (5)$$

The standard error of estimate is the square root of $\hat{V}(\hat{Y}_R)$

2.2 Prediction

The prediction approach recognizes that after data are collected from the sample agencies, the population total can be written (3)

$$Y = \sum_{s} y_i + \sum_{\bar{s}} y_i \qquad (6)$$

where s denotes the set of different agencies included in the sample and $\bar{s}$ is the collection of agencies not in the sample. Since the first of the two sums in (6) is now known, the problem is to estimate the second sum (i.e., the number of health aides in agencies not in the sample). In the prediction approach, a weighted regression equation is calculated from the sample data expressing y as some function of x. The form of the equation, linear, polynomial, etc., is chosen by the investigator. The equation is then used to make a prediction for every agency not in the sample and the predictions are summed to obtain an estimate of the total in the non-sample agencies. A simple linear regression equation was chosen here because the first polynomial term, x^2, did not add any predictive information. In this equation, y is the dependent variable, x is the single independent variable and $1/p_i$ is the weight. The entire sample of n draws is used to calculate the equation. The result is

$$\hat{y}_i = a + bx_i \qquad (7)$$

The estimate of the total number of health aides in the population is

$$\hat{Y}_p = \sum_{i=1}^{n1} y_i + a\ (5739 - n1) + b\ (X - \sum_{i=1}^{n1} x_i) \qquad (8)$$

where n1 is the number of different agencies in the sample (i.e., 172, 272, 372, respectively). The first term on the r. h. s. is the sum over the different agencies in the sample. The last two terms are the sum of the predictions over all non-sample agencies. No attempt was made to estimate the variance of these estimates.

3.0 RESULTS

The results are given in Table 1. Overall, the accuracy of both methods was reasonably good. There were no wild discrepancies between the estimates and the true value of 25545 and five of the six estimates fell inside the 95 percent confidence interval as measured by the standard error of estimates given in the last column. The exception was the error of -2371 for the ratio estimate with sample size 372. The two methods are roughly equal in accuracy with the prediction method perhaps being slightly better. This result was a little surprising since the correlation between x and y was near .5 for all three samples so that the amount of variance in y explained by x was only about 25 percent. The ratio method requires less computational effort but the prediction method is more flexible in that the form of the equation may be varied and additional independent variables may be introduced quite readily. The tradeoff between effort and flexibility requires further investigation before a decision is made concerning which method to adopt. When sample data become available both methods can be applied to estimate a few variables and the results compared.

Some final points are of interest:

- Most data will be collected at the beneficiary level rather than the agency level. If population estimates are required, the beneficiary data for an agency can be aggregated and the methods described here can be applied.
- Problems of missing data and non-response have not been addressed. In nearly all surveys they are either implicitly estimated by some sort of weighting scheme or explicitly estimated by one of a variety of methods (substitution of mean, regression, 'hot-deck', etc.)
- Finally, it is worth repetition to note that much of the analysis will be concerned with estimating relationships rather than population totals. In some cases, analytical formulae are available for estimating their accuracy while in others the technique of balanced half-sample replication (4) could be used. The computational burden for this last technique can be quite heavy so some effort will be made to obtain existing computer programs from Government agencies.

REFERENCES

(1) Enger, Isadore. Selection of Sample Agencies. Memorandum dated Feb. 9, 1988. 9pp.

(2) Skinner, C. J. "Probability Proportional to Size (PPS) Sampling", in Encyclopedia of Statistical Sciences, Vol. 7, ed. by Samuel Kotz and Norman L. Johnson, John Wiley, NY, 1986, pp 237-241.

(3) National Center for Health Statistics. The Prediction Approach to Finite Population Sampling Theory: Application to the Hospital Discharge Survey. Series 2 - Number 55, 1973, 31pp.

(4) National Center for Health Statistics. Replication: An Approach to the Analysis of Data from Complex Surveys. Series 2 - Number 14, 1966, 38 pp.

Table 1. Estimates of Total Number of Health Aides in Population of Non-Large Agencies (True Value = 25,545)

Sample Size	Ratio Estimate		Prediction Estimate		Standard Error of Estimate
	Value	Error	Value	Error	
172	24911	- 634	25971	426	1851
272	23728	-1817	23628	-1917	1324
372	23174	-2371	24945	- 600	1105

SAMPLE DESIGN FOR HOME HEALTH STUDY

A random sample will be drawn from the list of home health agencies certified by HCFA. The number of agencies selected will depend on the number of patient records to be astracted from the agency's files. An equal number of records will be abstracted from each agency, the total number of abstracted records being 10,000. Thus if it is decided to abstract 25 records from each agency, a total of 400 agencies will be sampled; if 50 records per agency, are abstracted, 200 agencies will be sampled. While a larger number of agencies will enhance the "representativeness" of the sample and reduce respondent burden for each agency, the problem of obtaining the cooperation of the agency initially to participate in the study will be increased.

Sample agencies will be selected proportional to size--number of FTE nurses. Thus, the sample will include a higher proportion of larger agencies than smaller ones. A computer program will generate the random selection of sample agencies. Back-up agencies will be provided to replace those that refuse to participate.

The selected sample will be examined to determine how closely it matches the universe of home health agencies according to geographic location and type of agency (size of agency will be controlled in the selection process). Adjustments will be made to the selected sample for any significant variations from universe characteristics.

GEORGETOWN UNIVERSITY
School of Nursing

Home Care Classification Project

PROPOSED SAMPLE FRAME
January 15, 1988

CLASSES BY STAFF SIZE (Range)	AGENCIES				RN's				
	MEDICARE TOTAL		SAMPLE TOTAL		MEDICARE TOTAL		SAMPLE CASES		
	#	%	#	%	#	%	#	per agency	#
1> TO <5 *	3627	61.7	40	1.10	8735	20.16	25	=	1000
5 TO <14	1649	28.0	59	3.58	12648	29.19	50	=	3000
14 TO <65	541	9.2	60	11.09	13059	30.14	50	=	3000
65 AND OVER	63	1.1	41	65.08	8887	20.51	75	=	3000
ALL	5880	100.0	200		43228				10,000

* There are 113 agencies with less than one nurse that were not excluded.

5. RESEARCH PROJECT

Appendix 5.1

5.1A	Revised Research Plan (Omitted)
5.1B	Revised Milestone Chart (Omitted)
5.1C	Policy on Confidentiality
5.1D	Panel Meetings

POLICY ON CONFIDENTIALITY

Procedure for collecting data

The project staff will provide the national sample agencies with a plan for selecting patient records. The plan will provide the criteria for identifying eligible records i.e., Medicare cases that contain the HCFA Forms 485, 486 and 487, etc. Each agency will be instructed to identify all discharged cases for the previous 6 months or the last 100 discharged cases, whichever is larger. If there are more than 100 patient records for the previous 6 months, then the agency will be given a method to select the cases.

Each agency will be required to identify records by the patient's social security number, home care project sequence number and their internal agency control number. The patient's social security number will be used only for cross referencing home care data if HCFA Medicare claims data are used. The project form(s) used to collect the study data will contain only the project sequence number.

A cross reference list will be maintained by the agency director and project principal investigator and project director. All analysis within the project would utilize the project sequence number. The names, addresses and social security numbers of individuals will not be released or used in any publication. No individual data will be identifiable in any project publication.

The cross reference list will be secured in a locked filing cabinet when not in use. Computer listings will be encrypted with keys known only to the principal investigator and senior project staff.

Panel Meetings

Meetings with the panel of experts will be designed to provide external review and comments at critical points in the project life-cycle. The experts have been selected to provide a wide range of clinical, administrative, research and methodology expertise. The experts invited to specific meetings will vary according to the guidance needed at that point in the project.

Most of the experts have significant professional interest in the outcome of the project. these people have agreed to serve on the panel without compensation (the project will pay travel and expenses, but no honorarium.) In addition to the experts with professional interest in the project, methodological consultants will be utilized to provide breadth and depth in the design, analysis, and interpretation of the project. The budget has been amended to provide consultation funds to pay expenses and fees for the consultants.

The meetings of the expert panels are noted on the Milestone Chart. The composition and reason for each meeting follows.

P1 - August, 1987	Initializing the project.
Composition	Clinical and Administrative experts.
Purpose	Solidify support from key leaders in the Home Care field; solicit advice on getting cooperation from the pilot agencies.
P2 - October, 1987	Operationalizing the plan.
Composition	Clinical home care experts and administrative agency directors.
Purpose	Agreement to serve as pilot agencies. Note: This meeting will be held in conjunction with the National Association of Home Care annual meeting. No travel or per diem costs will be incurred.

P3 - November, 1987	Develop Abstract form.
Composition	Home care administrative experts. Selected Home Care clinical experts. Research methodology consultants.
Purpose	Review and comment on draft data abstracting forms based on clinical relevance, data availability, requirements for statistical techniques. Also solicit input on possible outcome measures for use in developing the outcome measures analysis.
P4 - February, 1988	Develop outcome measures
Composition	Selected home care clinical experts. Research methodology consultants.
Purpose	Review and comment on draft outcome measures. Review and comment on the data collection plan.
P5 - August, 1988	Review data collection activities
Composition	Reaserch methodology consultants.
Purpose	Review the data collection efforts for possible mid-course correction.
P6 - September, 1988	Analyze validity and reliability of data collection.
Composition	Research methodology consultants.
Purpose	Review the results of the ongoing reliability and validity analyses of the data collection.
P7 - December, 1988	Review data analysis results.
Composition	Home care administration experts. Home care clinical experts. Research methodology consultants.
Purpose	Review data analysis results, and discuss implications for classification use.

P6 - March, 1989	Review Classification tool.
Composition	Home care administrative experts. Home care clinical experts.
Purpose	Review the final draft classification tool and provide advice on implementation.
P9 - May, 1989	Review project products and draft final report.
Composition	Home care administration experts. Home care clinical experts. Research methodology consultants.
Purpose	Review and comment on the final classification tool, implementation materials, computer support system, and manuals; suggest further work to be accomplished as a result of the project's outcomes.

5. RESEARCH PROJECT

Appendix 5.2 ......Omitted

5.2A Selected News Release:	**Georgetown University Medical Center** (Nursing School Studies Home Health Care Grant News pg. 2.)
5.2B Selected News Release:	**Georgetown University School of Nursing News** GU Nursing School Receives Award to Study Home Health Care (GU News 10/9/87)
5.2C Selected News Release:	**NAHC Report** HCFA Approves $670,000 Patient Classification Study; May Impact on Development of Prospective Pay for Home Health Agencies (NAHC Report No. 224)
5.2D Abstracts	

5. RESEARCH PROJECT

Appendix 5.3.....Omitted

5.3 Panel of Expert Members

5. RESEARCH PROJECT

Appendix 5.4 .....Omitted

5.4 List of 15 Pretest Home Health Agencies

5. RESEARCH PROJECT

Appendix 5.5

Solicitation Packet

5.5A Letter to Agency Director (9/13/88)

5.5B Project Abstract .....Omitted

5.5C Letter of Support from HCFA ....Omitted

5.5D Agency Participation Form

GEORGETOWN UNIVERSITY

School of Nursing
Home Health Care
Classification Project

September 13, 1988

Dear Agency Director:

We are pleased to inform you that your agency has been chosen as part of the national sample for our Home Health Care Classification Project. The purpose of the study is to develop and demonstrate a method for classifying home health patients to predict resource requirements and to measure outcomes.

The project, which is being conducted by the Georgetown University School of Nursing, has been funded by the Health Care Financing Administration (HCFA). It is an outgrowth of a pilot study initiated by the National Association for Home Care (NAHC)'s Information Resources Committee.

Your agency was randomly selected from the master list of certified home health care agencies provided by HCFA which we stratified by size, ownership, and geographic location. The national sample, of which you are a part, consists of approximately 400 agencies from whom we plan to collect data on 10,000 recently discharged Medicare cases.

Because this is a project being conducted as a Cooperative Agreement with HCFA, you will not need permission from the Medicare patients to abstract their records. The enclosed letter of endorsement from HCFA highlights this point. For your information we will only publish data in the aggregate, thus maintaining patient confidentiality. Also, the information will NOT be used to verify or otherwise analyze claims data.

We are asking your agency to abstract at least 10 and no more than 50 of the most recent discharged Medicare patient records that have been processed. The data will be collected onto a specially designed Abstract Forms. In addition, we are requesting that the patient's primary nurse, if possible, be interviewed for information that may not be found in the record. It is estimated that the abstracting process including the time to interview the primary nurse, will take 45 minutes for each case.

To assist you in this endeavor, we will provide the necessary forms, materials and instructions that you will need to participate in the project. In addition, we will provide technical support through a toll-toll free telephone number.

3700 Reservoir Road NW Washington DC 20007
202-687-2457

We hope you will assist us with this important project. We feel certain that you are as committed as we are to the project's goal of incorporating the nursing perspective in home health care and influencing on HCFA policy making decisions for the industry. We will share the results of the study with you as soon as we receive permission to do so from HCFA.

If your agency is willing to make this commitment, please complete and mail the enclosed participation form to the Home Health Care Classification Project office no later than November 15th. You can also call us on the toll free number with your decision.

Once your letter arrives, we will send your materials so you can begin to collect data in October. You will have approximately 90 days to complete the abstracting process and return the materials to us.

A copy of the project Abstract is enclosed for your information. If you have any questions about the project, please feel free to call the project office at 1-800-426-0980.

Sincerely,

Virginia K. Saba, R.N., Ed.D.
Principal Investigator/
Project Director

Val J. Halamandaris
President,
National Association
for Home Care

Appendix 5.5D: Solicitation Packet
Agency Participation
Form

AGENCY PARTICIPATION FORM

Yes, I am willing to participate in the Georgetown University Home Care Classification project. I understand its purpose is to develop and demonstrate a method for classifying home health patients to predict resource requirements and to measure outcomes. I further understand patient data will be kept confidential because data will be reported in the aggregate. Also, the information will NOT be used to verify or otherwise analyze claims data.

Please CIRCLE number of patient records your agency is willing to abstract:

10 25 50 Other (specify)__________

AGENCY NAME:

ADDRESS

DIRECTOR/ADMINISTRATOR______________________________

CONTACT PERSON______________________________

TITLE______________________________

TELEPHONE ( )______________________________

Please send participation form to:
Virginia K. Saba, R.N., Ed.D.
Principal Investigator/Project Director
Home Health Care Classification Project
GEORGETOWN UNIVERSITY - SCHOOL OF NURSING
3700 Reservoir Road, N.W.
Washington, D.C. 20007

Telephone Number: 1-800-426-0980

PLEASE RETURN THIS FORM IN THE ENCLOSED, PRE-ADDRESSED ENVELOPE

5. RESEARCH PROJECT

Appendix 5.6

Project Materials

5.6A Letter to Agency Director

5.6B General Instructions

5.6C Agency Information Form

5.6D Agency Packaging Form

5.6E Abstract Form..............Omitted

[illegible]
Agency Director Lett

GEORGETOWN UNIVERSITY

School of Nursing
Home Health Care
Classification Project

January 1988

Dear Director

Thank you for responding to our letter of November 1988 and volunteering to participate in the Georgetown University School of Nursing Home Health Care Classification Project. As we stated in our letter, the enclosed Abstract Forms you agreed to complete are being used to collect minimal uniform data from a national population of 10,000 recently discharged Medicare patients.

The project is being conducted as a Cooperative Agreement with the Health Care Financing Administration (HCFA) who has given us the legal authority to abstract the records of Medicare cases. Therefore, you do not need permission of the patients to abstract their records. ALL DATA WILL BE KEPT CONFIDENTIAL. Results will ONLY be reported in the aggregate and will NOT be used to analyze claims data.

Enclosed are the materials for your agency. They include (a) General Instructions, (b) Agency Information Form, (c) Abstract Forms--one file copy and a packet of forms as per your request, and (d) Mailing Materials--label and envelope with return postage.

Please return the project materials as soon as possible, but no later than March 15, 1989. If you have any questions, please call the Georgetown University Home health Care Classification Project Office toll free number: 800-426-0980.

Your participation is essential and your effort is commendable.

Sincerely,

Virginia K. Saba

Virginia K. Saba, R.N., Ed.D.
Principal Investigator/
Project Director

3700 Reservoir Road NW Washington DC 20007
202-687-2457

GEORGETOWN UNIVERSITY

School of Nursing
Home Health Care
Classification Project

SCHOOL OF NURSING

Home Health Care Classification Project

GENERAL INSTRUCTIONS
Fall - 1988

OVERVIEW

As a participant in the Home Health Classification Project it is recommended that you use the following basic procedures in order to efficiently carry out the project:

1. ASSIGN one person to be responsible for the conduct of the project in your agency.
2. ASSIGN one nurse in EACH unit/branch office to ABSTRACT data and INTERVIEW nurses.
3. ALLOW time for the primary nurse or nurse most familiar with the case to be INTERVIEWED by the abstractor for RECALL questions as specified on the Abstract Form.
4. SELECT patient records for the project sample using the Selection Procedure below.
5. REVIEW and USE the Project Definitions as described below.
6. COMPLETE Agency Information Form.
7. RETURN completed forms as soon as possible, but no later than March 15, 1989.
8. RECORD dates on separate page and attach to Form if calendar months for Items 49-54 do NOT cover Episode of Care.

Please CALL if there are questions using the Georgetown Home Health Care Classification Project Office toll free number: 1-800-426-0980.

3700 Reservoir Road NW Washington DC 20007
202-687-2457

SELECTION PROCEDURE

The purpose of this Selection Procedure is to assist you in obtaining a random sample of Patient Records to be abstracted.

1. SELECT ONLY those Patient Records that MEET the following CRITERIA:
   a. CONTAIN HCFA Forms 485, 486, and 487.
   b. INCLUDE at least ONE visit billed to Medicare,
   c. CONTAIN evidence that skilled nursing services were provided for an Episode of Care.
2. SELECT your random sample by (a) starting with the most recently processed discharged Medicare Patient Record and then (b) working backwards taking every fifth (5th) case until you reach the number you agreed to abstract.

PROJECT DEFINITIONS

Episode of Care: An admission to a certified home health agency which has been initiated by a referral and includes a nursing assessment for a specific illness and/or condition. Continuous services are provided by nurses and other disciplines to meet the care requirements of the patient. Services may be interrupted by periods of hospitalization for same or other conditions(s). The Episode of Care is terminated when patient services are discontinued and the patient is discharged.

Admission: Date of first visit to patient to start home health care services.

Discharge: Date of last visit or date of last documentation in the record on behalf of the patient.

Visit: A visit to a patient's home by a home health agency provider to provide home health care services.

[illegible]
Agency Information
Form

GEORGETOWN UNIVERSITY

School of Nursing
Home Health Care
Classification Project

SCHOOL OF NURSING

Home Health Care Classification Project

AGENCY INFORMATION FORM
Fall - 1988

PURPOSE

This Home Health Agency Information Form is designed to collect data to enhance the analysis of data collected on the Abstract Form. This form is used to collect data for ONLY the certified Home Health Agency Program.

AGENCY NAME:

ADDRESS:

PROVIDER NO: ______________________

TEL NO: (___)____-______________

1. AGENCY TYPE:
[Circle only one]

(1) Public/Official/ Combination
(2) Voluntary Non-Profit (e.g. VNA)
(3) Private Non-Profit
(4) Proprietary
(5) Hospital-Based
(6) Other (specify) ________________

2. POPULATION SERVED:
[Circle most appropriate one]

(1) Urban Only
(2) Urban/suburban only
(3) Rural only

3. NUMBER OF YEARS HOME HEALTH AGENCY IN OPERATION: __________

4. AGENCY PERSONNEL:
ENTER total number of budgeted Full Time Equivalents (FTEs) by discipline for the Home Health Agency Program as of October 1, 1988.

Discipline Type	Budgeted Full Time Equivalents
4.1 Registered Nurse	
4.2 Licensed Practical Nurse	
4.3 Physical Therapist	
4.4 Occupational Therapist	
4.5 Speech Therapist	
4.6 Medical Social Worker	
4.7 Home Health Aide	
4.8 Other Care Providers	

5. AGENCY SERVICES AVAILABILITY:
ENTER availability of Home Health Services for a normal work work week.

5.1 Total number of hours available per day __________

5.2 Total number of days available per week __________

6. INTERMITTENT SKILLED CARE SERVICES FOR LAST FISCAL YEAR:

6.1 ENTER total number of patients served (unduplicated count) __________

6.2 ENTER total number of admissions (cases) __________

6.3 ENTER total number of ALL visits __________

GEORGETOWN UNIVERSITY

School of Nursing
Home Health Care
Classification Project

SCHOOL OF NURSING

HOME HEALTH CARE CLASSIFICATION PROJECT

AGENCY PACKAGING FORM
FALL 1988

* * *

DEAR

ENCLOSED ARE THE ________ ABSTRACT FORMS YOU REQUESTED.

Virginia K. Saba

GEORGETOWN UNIVERSITY
SCHOOL OF NURSING

Home Health Care Classification Project
ABSTRACT FORM
Fall, 1988

Dear Abstractor:

This ABSTRACT FORM is for the Home Health Care Classification Project being conducted by the Georgetown University School of Nursing. The ABSTRACT FORM is used to record data on recently discharged Medicare patients served by your certified home health agency for an Episode of Care, and processed for discharge within the last 90 days. The selected patient records for this project were based on a sampling strategy outlined in the Agency Director's project materials.

GENERAL INSTRUCTIONS

USE the entire patient record to ABSTRACT data. Include ALL HCFA Forms (485, 486, & 487) and ALL other forms in record used to document care. If multiple HCFA forms are found, include ALL new or changed data to provide an aggregated record of Episode of Care. If data varies on multiple forms, INDICATE what appears MOST OF THE TIME in record.

The ABSTRACT FORM uses several different types of questions. They include:

• Single Answer:	ENTER one code number from a list.
• Multiple Answer:	ENTER one code number for each item on a multiple list.
• Numeric Answer:	ENTER total count for a specific item.
• Circle Answer:	CIRCLE items on a precoded list.
• Free Text:	RECORD narrative as found in record.

SPECIFIC INSTRUCTIONS

FOLLOW the rules specified below. If you have any questions, CALL Georgetown Project Office at 1-800-426-0980.

- READ entire patient record for Episode of Care and definitions before abstracting data.
- USE ALL forms in patient record.
- COMPLETE forms as directed so they are legible.
- ALL questions refer to patient unless caregiver is specified.
- FOLLOW instructions as specified in brackets [ ].
- USE code numbers found in parentheses ( ).
- ENTER code number on the line in left margin unless otherwise specified.
- INTERVIEW primary nurse or nurse most familiar with the case, if possible, for RECALL questions as specified. If nurse is not available for RECALL, and data are not found in record, then ENTER unknown rather than interpreting data.
- DO NOT LEAVE any item(s) blank.

DEFINITIONS

USE the following definitions:

National Sample: The sample consists of recently discharged Medicare patient records that have been processed within last 90 days. The records include: (a) HCFA Form(s) 485, 486, or 487, (b) at least one visit billed to Medicare, and (c) evidence that nursing service(s) were provided for an Episode of Care.

Episode of Care: An admission to a certified home health agency which has been initiated by a referral and includes a nursing assessment for a specific illness and/or condition. Continuous services are provided by nurses and other disciplines to meet the care requirements of the patient. Services may be interrupted by periods of hospitalization for same or other condition(s). The Episode of Care is terminated when patient services are discontinued and patient is discharged.

Admission: Date of first visit to patient to start home health agency services.

Discharge: Date of last visit or date of last documentation in record on behalf of patient.

Visit: A visit to patient's home by home health agency provider to provide home care services.

I. ADMINISTRATIVE DATA

This Page, upon receipt at Georgetown University School of Nursing Home Health Care Project Office, will be REMOVED and FILED in a locked cabinet. It will ONLY be used to trace a patient record if necessary by project staff.

1. Agency Name: ______________________________

2. Agency HCFA Provider Number: ______________________________

3. Patient's Primary Nurse Name (if possible): ______________________________

4. Abstractor Name: ______________________________

5. Date of Abstract: ☐☐ ☐☐ ☐☐
Month Day Year

6. Patient Identification:

6.1 Last Name: ______________________________

6.2 Zip Code: ______________________________
[ENTER Zip Code where patient services were provided]

7. Patient Medicare Claim Number: ______________________________

8. Patient Agency Record Number: ______________________________

II. PATIENT ADMISSION DATA

INDICATE admission data to Home Health Agency for services for most recent Episode of Care. ***[ENTER date of first visit to patient]***

9. Admission Date:

Month	Day	Year
☐☐	☐☐	☐☐

___ **10.** Patient Admission Status:
[ENTER one code]
- (1) New Admission—New to Agency
- (2) Re-admission—Previously Known to Agency

III. PATIENT SOCIO-DEMOGRAPHIC DATA

INDICATE socio-demographic data about patient at site where services are provided. ***[ENTER one code number, found in parenthesis ( ), for each question unless otherwise specified]***

11. Date of Birth:

Month	Day	Year
☐☐	☐☐	☐☐☐☐

___ **12.** Sex:
- (1) Male
- (2) Female

___ **13.** Race/Ethnic Group:
- (1) White/not Hispanic
- (2) Black/not Hispanic
- (3) Hispanic
- (4) Asian/Pacific Islander
- (5) American Indian/Alaskan Native
- (9) Unknown

___ **14.** Marital Status on Admission:
- (1) Never Married
- (2) Married
- (3) Widowed
- (4) Separated
- (5) Divorced
- (9) Unknown

___ **15.** Living Arrangements:
- (1) Alone
- (2) Spouse Only
- (3) Spouse and/or Children
- (4) Family or Relative(s)
- (5) Non-relative(s)
- (9) Unknown

___ **16.** Available Primary Caregiver:
- (1) Self
- (2) Spouse Only
- (3) Informal/Not Paid: Family, Relative(s), or Friend(s)
- (4) Formal/Paid: Community Agency or Living in a Personal Care Home
- (9) Unknown

___ **17.** Housing:

(1) Detached House
(2) Row, Townhouse
(3) Apartment, Flat
(4) Room, Rented
(5) Adult, Personal Care Home
(6) Mobile Home
(9) Unknown

___ **18.** Comprehension Level (Understands Instructions) of Patient:

(1) Able to Comprehend
(2) Partially Able to Comprehend
(3) Unable to Comprehend

___ **19.** Communication Skills (Conveys Information) of Patient:

(1) Able to Communicate
(2) Partially Able to Communicate
(3) Unable to Communicate

___ **20.** Pet(s) in Residence:

(1) Yes
(2) No
(9) Unknown

21. Payment Source:

INDICATE ALL payment sources for services provided.

[ENTER code: (1)=YES or (2)=NO for each item]

___ **21.1** Medicare
___ **21.2** Medicaid
___ **21.3** Other Insurance
___ **21.4** Other (Specify) ______________________
___ **21.5** Self Pay (full/part)
___ **21.6** Free

IV. PATIENT EPISODE OF CARE

___ **22.** Referral Source:

INDICATE **source** of referral or **type** of health care facility from which patient was discharged prior to start of service by Home Health Agency.

[ENTER one code]

(1) Acute Care Hospital
(2) Nursing Home
(3) Rehabilitation Hospital
(4) Physician's Office
(5) Outpatient Clinic
(6) Other Community Agency or Program
(7) Self
(8) Family, Friend
(9) Unknown

23. Preadmission Hospitalization:

INDICATE if hospital stay occurred immediately prior to agency admission.

USE initial HCFA Form 486. Item 12 (old) OR
Item 14 (new)

[ENTER hospital stay dates or code: (0's)=NOT APPLICABLE]

23.1 Admission Date: |_|_| |_|_| |_|_|
Month Day Year

23.2 Discharge Date: |_|_| |_|_| |_|_|
Month Day Year

24-29 **MEDICAL DIAGNOSES**

USE ALL HCFA Form(s) 485 for Episode of Care.

[ENTER ICD-9-CM code(s) and/or narrative]

[ENTER code: (0's)=NOT APPLICABLE]

24. Principal Medical Diagnosis:

24.1 |_|_|_| . |_|_| **25.1** Text ____________________

26. Surgical Procedure:

26.1 |_|_|_| . |_|_| **27.1** Text ____________________

28. Other Pertinent Diagnoses:

28.1 |_|_|_| . |_|_| **29.1** Text ____________________

28.2 |_|_|_| . |_|_| **29.2** Text ____________________

28.3 |_|_|_| . |_|_| **29.3** Text ____________________

28.4 |_|_|_| . |_|_| **29.4** Text ____________________

____ **30.** All Other Diagnoses/Surgical Procedures:
[ENTER number other diagnoses NOT listed above, or code: (0)=NONE]

____ **31.** Medicare Certification Periods:
[ENTER number of certification periods for Episode of Care]

____ **32.** IF patient was hospitalized during this Episode of Care:
[ENTER number times hospitalized, or code: (0)=NONE, or (99)=UNKNOWN]

V. PATIENT ASSESSMENT DATA

INDICATE data on patient assessment using entire record. USE initial HCFA Form 485, additional HCFA Form(s) and ALL other forms in record.

INCLUDE ALL NEW or CHANGED data to provide aggregated data for Episode of Care. IF data varies, then INDICATE what appears MOST OF TIME in record.

FOLLOW instructions as specified. Some questions require one answer and others one answer for multiple items.

33. Medications:

INDICATE number of prescribed medications, by type, ordered for patient.
COUNT same medication ONLY once.
USE HCFA Form(s) 485 Item 13 (old) OR
Item 10 (new) and other forms in record.

—— **33.1** ARE Medications Prescribed? ***[ENTER code: (1)=YES or (2)=NO]***
[If (1)=YES, then ENTER total number of Medications for each item below]
—— **33.2** Oral (PO)
—— **33.3** Intramuscular/Subcutaneous (IM/SC)
—— **33.4** Intravenous (IV)
—— **33.5** Eye, Ear, Nose
—— **33.6** Topical/Ointment (e.g., nitro patch)
—— **33.7** Rectal/Vaginal
—— **33.8** Sublingual
—— **33.9** Other (Specify) ______________________

34. Other Therapies:

INDICATE if patient is receiving therapy(ies) in home.
[ENTER code: (1)=YES or (2)=(NO)] for each item]

—— **34.1** Inhalation Therapy
—— **34.2** Chemotherapy
—— **34.3** Oxygen Therapy
—— **34.4** Intravenous Therapy
—— **34.5** Other (Specify) ______________________

35. Medical Supplies:

INDICATE ALL non-routine supplies used by/for patient.

USE HCFA Form(s) 485 Item 16 (old) OR
Item 14 (new) and other forms in record.

[ENTER code: (1)=YES or (2)=NO for each item]

____ **35.1** Wound Supplies
____ **35.2** Needles/Syringes/IV Sets
____ **35.3** Catheterization kits
____ **35.4** Decubiti Supplies
____ **35.5** Ostomy Supplies
____ **35.6** Feeding Bags, Tubing
____ **35.7** Chux Pads, Diapers
____ **35.8** Enema, Bowel Kits

36. Durable Medical Equipment (DME):

INDICATE **additional** DME not listed on HCFA Form(s) 485, Item 18.B "Activities Permitted."

USE HCFA Form(s) 485 Item 16 (old) OR
Item 14 (new) and other forms in record.

[ENTER code: (1)=YES or (2)=NO for each item]

____ **36.1** Toileting Equipment
____ **36.2** Bed Appliances
____ **36.3** Rehabilitation Equipment
____ **36.4** Respiratory Equipment
____ **36.5** Feeding Equipment
____ **36.6** Safety Equipment

37. Safety Measures:

INDICATE ALL instructions on safety measures for patient.

USE HCFA Form(s) 485 Item 11 (old) OR
Item 15 (new) and other forms in record.

[ENTER code: (1)=YES or (2)=NO for each item]

____ **37.1** Environmental Hazards (i.e., clear pathways, remove scatter rugs)
____ **37.2** Patient Care Precautions (i.e., safe transfer, ambulation, smoking precautions)
____ **37.3** Disease Precautions (i.e., bleeding, cardiac, respiratory)
____ **37.4** Isolation Precautions
____ **37.5** Equipment Precautions (i.e., oxygen, heating pad, siderails)

____ **38.** Nutritional Requirements:

INDICATE patient's dietary requirements MOST OF TIME.

USE HCFA Form(s) 485 Item 15 (old) OR
Item 16 (new) and other forms in record.

[ENTER one code]

(1) Regular Diet
(2) Special Diet
(3) Tube Feeding
(4) Hyperalimentation/Parenteral
(5) Other (Specify) ____________________

39. Functional Limitations:

INDICATE ALL **assessed** functional limitations for patient as found MOST OF TIME

USE HCFA Form(s) 485 Item 10 (old) OR
Item 18A (new) and other forms in record.

[ENTER code: (1)=YES or (2)=NO for each Item]

___ **39.01** Amputation
___ **39.02** Bowel/Bladder (Incontinence)
___ **39.03** Contracture
___ **39.04** Hearing
___ **39.05** Paralysis
___ **39.06** Endurance
___ **39.07** Ambulation
___ **39.08** Mental
___ **39.09** Speech
___ **39.10** Legally Blind/Vision
___ **39.11** Dyspnea with Minimal Exertion/Respiratory
___ **39.12** Other (Specify) ___

40. Activities Permitted:

INDICATE ALL activities **allowed** for patient as found MOST OF TIME.

USE HCFA Form(s) 485 Item 10 (old) OR
Item 18B (new) and other forms in record.

[ENTER code: (1)=YES or (2)=NO for each Item]

___ **40.01** Complete Bedrest
___ **40.02** Bedrest BRP
___ **40.03** Up as Tolerated
___ **40.04** Transfer Bed, Chair
___ **40.05** Exercises Prescribed
___ **40.06** Partial Weight-Bearing
___ **40.07** Independent at Home
___ **40.08** Crutches
___ **40.09** Cane
___ **40.10** Wheelchair
___ **40.11** Walker
___ **40.12** No Restriction
___ **40.13** Other (Specify) ___

41. Mental Status:

INDICATE Item(s) that describe patient's mental status as found MOST OF TIME.

USE HCFA Form 485 Item 14 (old) OR
Item 19 (new) and other forms in record.

[ENTER code: (1)=YES or (2)=NO for each item]

___ **41.1** Oriented
___ **41.2** Comatose
___ **41.3** Forgetful
___ **41.4** Depressed
___ **41.5** Disoriented
___ **41.6** Lethargic
___ **41.7** Agitated
___ **41.8** Other (Specify) ____________

42. Prognosis:

INDICATE Physician's **initial** prognosis for patient.

USE **initial** HCFA Form 485 Item 20 (old) OR
Item 20 (new)

[ENTER one code]

(1) Poor	(4) Good
(2) Guarded	(5) Excellent
(3) Fair	(9) Unknown

VI. PATIENT SERVICES

INDICATE ALL home health services (treatments) provided by each discipline during Episode of Care to patient.

USE visit forms, progress notes, and ALL other forms in record.

43. Patient Services Provided:

[CIRCLE code numbers below for ALL treatments provided by EACH discipline]

[FOR ONLY Professional/Skilled Nursing Services CIRCLE appropriate codes. For services not listed below, ENTER narrative as found in patient record on next page—Item 44. They INCLUDE:

- ***(a) A1's, A7's and A27's not detailed below,***
- ***(b) ALL other nursing services—treatments, activities and interventions—such as "refer patient to medical social worker"]***

Treatment Codes for Home Health Services

Skilled Nursing

A1	(Skilled Observation (Inc. V.S., Response to Med., etc.)
A2	Foley Insertion
A3	Bladder Instillation
A4	Open Wound Care Dressing
A5	Decubitus Care-Stage 3, 4, 5
A6	Venipuncture
A7	Restorative Nursing
A8	Post Cataract Care
A9	Bowel/Bladder Training
A10	Chest Physio (Inc. Postural Drainage)
A11	Adm. of Vitamin B_{12}
A12	Adm. Insulin
A13	Adm. Other IM Subq.
A14	Adm. IV's/Clysis
A15	Teach. Ostomy or Ileo Conduit Care
A16	Teach Nasogastric Feeding
A17	Reinsertion Nasogastric Feeding Tube
A18	Teach Gastrostomy Feeding
A19	Teach Parenteral Nutrition
A20	Teach Care of Trach
A21	Adm. Care of Trach
A22	Teach Inhalation Rx
A23	Teaching Care of any Indwelling Catheter
A24	Teach Adm. of Injection
A25	Teach Diabetic Care
A26	Disimpaction/F.U. Enema
A27	Other (Specify under Orders)
A28	Wound Care/Dressing-Closed Incision/Suture Line
A29	Decubitus Care-Stage 1, 2

Physical Therapy

B1	Evaluation
B2	Therapeutic Exercise
B3	Transfer Training
B4	Home Program
B5	Gait Training
B6	Chest Physiotherapy
B7	UltraSound
B8	ElectroTherapy
B9	Prosthetic Training
B10	
B14	Reserved
B15	Other (Specify under Orders)

Speech Therapy

C1	Evaluation
C2	Voice Disorders Treatments
C3	Speech Articulation Disorders Treatments
C4	Dysphagia Treatments
C5	Language Disorders Treatments
C6	Aural Rehabilitation
C7	Reserved
C8	Non-oral Communication
C9	Other (Specify under Orders)

Medical Social Services

E1	Assessment of Social and Emotional Factors
E2	Counseling for Long Range Planning and Decision Making
E3	Community Resource Planning
E4	Short Term Therapy
E5	Reserved
E6	Other (Specify under Orders)

Home Health Aide

F1	Tub/Shower Bath
F2	Partial/Complete Bed Bath
F3	Reserved
F4	Personal Care
F5	Reserved
F6	Catheter Care
F7	Reserved
F8	Assist with Ambulation
F9	Reserved
F10	Exercises
F11	Prepare Meal
F12	Grocery Shop
F13	Wash Clothes
F14	Housekeeping
F15	Other (Specify under Orders)

Occupational Therapy

D1	Evaluation
D2	Independent Living/Daily Living Skills (ADL Training)
D3	Muscle Re-education
D4	Reserved
D5	Perceptual Motor Training
D6	Fine Motor Coordination
D7	Neuro-developmental Treatment
D8	Sensory Treatment
D9	Orthotics/Splinting
D10	Adaptive Equipment (fabrication and training)
D11	Other (Specify under Orders)

44-45 Professional Skilled Nursing Services:

INDICATE for ONLY Professional Skilled Nursing Services ALL other significant treatments, activities, and interventions provided during Episode of Care not listed on previous page (Item 43), regardless of reimbursement.

USE visit forms, progress notes, and ALL other forms in record.

[ENTER narrative as found in patient record. They INCLUDE:

(a) A1's, A7's and A27's not detailed in Item 43,

(b) ALL other nursing services—treatments, activities, and interventions—such as "refer patient to medical social worker"]

---

44. Professional Skilled Nursing Services (Treatments/Activities/Interventions) ***[ENTER NARRATIVE]***

45. Code # ***[LEAVE BLANK]***

44.01 ____________________ **45.01** ______

44.02 ____________________ **45.02** ______

44.03 ____________________ **45.03** ______

44.04 ____________________ **45.04** ______

44.05 ____________________ **45.05** ______

44.06 ____________________ **45.06** ______

44.07 ____________________ **45.07** ______

44.08 ____________________ **45.08** ______

44.09 ____________________ **45.09** ______

44.10 ____________________ **45.10** ______

44.11 ____________________ **45.11** ______

44.12 ____________________ **45.12** ______

44.13 ____________________ **45.13** ______

44.14 ____________________ **45.14** ______

44.15 ____________________ **45.15** ______

44.16 ____________________ **45.16** ______

44.17 ____________________ **45.17** ______

44.18 ____________________ **45.18** ______

44.19 ____________________ **45.19** ______

44.20 ____________________ **45.20** ______

VII. NURSING ASSESSMENT OF PATIENT PROBLEMS/NURSING DIAGNOSES

INDICATE ALL patient problems and/or nursing diagnoses **assessed** by nurse provider on admission or **reassessed** during Episode of Care. Also INDICATE, **status** for EACH patient problem and/or nursing diagnosis on discharge.

[ENTER narrative found in record]

[If discharge status not found in record, INTERVIEW Primary Nurse for RECALL. IF Primary Nurse not available ENTER Unknown]

---

46. Assessment of Patient Problems/ Nursing Diagnoses:

47/48. Discharge Status Codes:

- (1) Resolved
- (2) Improved
- (3) No Change
- (4) Stabilized/Maintained
- (5) Deteriorated/Worse
- (9) Unknown

---

46. Patient Problem/Nursing Diagnosis ***[ENTER TEXT]***

47. Discharge Status ***[ENTER Code #]***

48. Code # ***[LEAVE BLANK]***

46.01 ____________________ **47.01** ______ **48.01** ______
46.02 ____________________ **47.02** ______ **48.02** ______
46.03 ____________________ **47.03** ______ **48.03** ______
46.04 ____________________ **47.04** ______ **48.04** ______
46.05 ____________________ **47.05** ______ **48.05** ______
46.06 ____________________ **47.06** ______ **48.06** ______
46.07 ____________________ **47.07** ______ **48.07** ______
46.08 ____________________ **47.08** ______ **48.08** ______
46.09 ____________________ **47.09** ______ **48.09** ______
46.10 ____________________ **47.10** ______ **48.10** ______
46.11 ____________________ **47.11** ______ **48.11** ______
46.12 ____________________ **47.12** ______ **48.12** ______
46.13 ____________________ **47.13** ______ **48.13** ______
46.14 ____________________ **47.14** ______ **48.14** ______
46.15 ____________________ **47.15** ______ **48.15** ______
46.16 ____________________ **47.16** ______ **48.16** ______
46.17 ____________________ **47.17** ______ **48.17** ______

VIII. VISIT DATA

INDICATE actual visit DATES provided by EACH type of home health discipline, by month, from admission until discharge.

____ 49. Skilled Nursing Visits:

[ENTER code: (1)=YES, (2)=NO and (9)=UNKNOWN]

____ 49.1 ***[IF "YES", CIRCLE actual date of visits]***

[If more than one visit provided per day, ENTER total in parentheses above coded date]

[IF NO NURSING VISITS PROVIDED EXCLUDE CASE]

October 1987

				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

November 1987

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

December 1987

		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

January 1988

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

February 1988

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

March 1988

		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

April 1988

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

May 1988

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

June 1988

			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

July 1988

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

August 1988

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September 1988

				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

____ 50. Home Health Aide Visits:

[ENTER code: (1)=YES, (2)=NO and (9)=UNKNOWN]

____ 50.1 ***[IF "YES", CIRCLE actual date of visits]***

October 1987

				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

November 1987

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

December 1987

		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

January 1988

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

February 1988

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

March 1988

		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

April 1988

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

May 1988

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

June 1988

			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

July 1988

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

August 1988

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September 1988

				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

____ 51. Physical Therapy Visits:

[ENTER code: (1) = YES, (2) = NO and (9) = UNKNOWN]

____ 51.1 *[IF "YES", CIRCLE* ***actual*** *date of ALL visits]*

October 1987

				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

November 1987

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

December 1987

		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

January 1988

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

February 1988

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

March 1988

		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

April 1988

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

May 1988

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

June 1988

			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

July 1988

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

August 1988

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September 1988

				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

____ 52. Occupational Therapy Visits:

[ENTER code: (1) = YES, (2) = NO and (9) = UNKNOWN]

____ 52.1 *[IF "YES", CIRCLE* ***actual*** *date of visits]*

June 1988

			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

July 1988

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

August 1988

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September 1988

				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

____ 53. Speech Therapy Visits:

[ENTER code: (1) = YES, (2) = NO and (9) = UNKNOWN]

____ 53.1 *[IF "YES", CIRCLE* ***actual*** *date of ALL visits]*

June 1988

			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

July 1988

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

August 1988

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September 1988

				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

____ 54. Medical Social Work Visits:

[ENTER code: (1) = YES, (2) = NO and (9) = UNKNOWN]

____ 54.1 *[IF "YES", CIRCLE* ***actual*** *date of ALL visits]*

June 1988

			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

July 1988

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

August 1988

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September 1988

				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

___ **55.** Visits **NOT** Billed to Medicare:
[ENTER number of agency visits billed to payers other than MEDICARE; or code: (0) = NONE or (99) = UNKNOWN]

___ **56.** Hospitalized Days During this Episode of Care:
[ENTER number days hospitalized; or code: (0) = NONE or (99) = UNKNOWN]

___ **57.** Telephone Calls/Conferences Recorded:
[ENTER number calls/conferences to or on behalf of patient; or code: (0) = NONE, or (99) = UNKNOWN]

IX. PATIENT ACTIVITY DATA

Activities of Daily Living (ADL):
INDICATE **level** of independence for each Activity on Admission and Discharge.
[If not found in record, INTERVIEW Primary Nurse for RECALL]
[IF Primary Nurse not available ENTER code: (9) = UNKNOWN]

[ENTER code for each activity level]

(1) Independent (able to perform activity)
(2) Assistance of person/device
(3) Dependent (unable to perform activity)
(9) Unknown

Activities of Daily Living

58. Bathing:
___ 58.1 Admission
___ 58.2 Discharge

59. Dressing:
___ 59.1 Admission
___ 59.2 Discharge

60. Toileting (bathroom/commode):
___ 60.1 Admission
___ 60.2 Discharge

61. Transfer:
___ 61.1 Admission
___ 61.2 Discharge

62. Continence (bowel/bladder control):
___ 62.1 Admission
___ 62.2 Discharge

63. Feeding (eating):
___ 63.1 Admission
___ 63.2 Discharge

64. Walking (ambulation):
___ 64.1 Admission
___ 64.2 Discharge

65. Telephone (using):
___ 65.1 Admission
___ 65.2 Discharge

66. Medication(s) (managing):
___ 66.1 Admission
___ 66.2 Discharge

X. PATIENT DISCHARGE SUMMARY DATA

INDICATE data about discharge of patient from home health agency services for Episode of Care.

[ENTER date of last visit or last date of documentation in record on behalf of patient]

67. Discharge Date: |_|_| |_|_| |_|_|
Month Day Year

____ 68. Status of Patient on Discharge:

[ENTER one code]

(1) Recovered
(2) Improved
(3) No Change
(4) Stabilized
(5) Deteriorated
(6) Expired in Home
(7) Expired in Hospital
(9) Unknown

____ 69. Disposition of Patient on Discharge:

[ENTER one code]

(1) Self/Family/Friend
(2) Hospital
(3) Nursing Home (SNF)
(4) Adult Home
(5) Other Institution
(6) Other Agency Resource/Program
(7) Other Community Agency
(8) Other (Specify) ____________
(9) Unknown

____ 70. Reason for Discharge:

[If not found in record, INTERVIEW Primary Nurse for RECALL]

[IF Primary Nurse not available ENTER code: (9) = UNKNOWN]

[ENTER one code]

(1) Services no Longer Needed
(2) Moved
(3) Refused Defined Treatment
(4) Caregiver no Longer Available
(5) Noncompliant
(6) Situation Unsafe for Staff
(7) Other (Specify) ____________
(9) Unknown

____ 71. Goals:

INDICATE if goals were accomplished for patient.

[If not found in record, INTERVIEW Primary Nurse for RECALL]

[IF Primary Nurse not available ENTER code: (9) = UNKNOWN]

[ENTER one code]

(1) Goals Met
(2) Goals Partially Met
(3) Goals Not Met
(4) Not Applicable (Specify Reason) ____________
(9) Unknown

____ 72. Motivation:

INDICATE if, in the nurse's judgement, patient was motivated to get better during care.

[INTERVIEW Primary Nurse for RECALL]

[IF Primary Nurse not available ENTER code: (9) = UNKNOWN]

[ENTER one code]

(1) Motivated
(2) Partially Motivated (Little)
(3) Not Motivated
(4) Not Applicable (Specify Reason) ____________
(9) Unknown

____ 73. Care Conclusion:

INDICATE, if in the opinion of primary nurse, additional nursing visits were needed to meet patient care requirements.

[INTERVIEW Primary Nurse for RECALL]

[IF Primary Nurse not available ENTER code: (99) = UNKNOWN]

[ENTER number of additional visits; code: (0) = NONE or (99) = UNKNOWN]

IF visits needed: SPECIFY for what services ____________

5. RESEARCH PROJECT

Appendix 5.7 .....Omitted

5.7 Letters of thanks to Agency Directors

6. DATA PROCESSING

Appendix 6.1

6.1A Nursing Diagnoses Scheme

6.1B Nursing Interventions Scheme

6.1C Rules for Coding Nursing Diagnoses and Nursing Interventions

6.1D Treatment Codes for Professional Services Required

Appendix [illegible] Nursing Diagnoses
Scheme

Georgetown University

School of Nursing

Home Health Care Classification Project

NURSING INTERVENTIONS SCHEME

February 27, 1990

Prefix Action Codes:

A - Assess
C - Care, Direct
M - Manage
T - Teach

Intervention Codes:

01.		Abuse Control
02.		Activity Care
	02.0	Cardiac Rehabilitation
	02.1	Energy Conservation
03.		Allergic Reaction Care
04.		Bladder Care
	04.0	Bladder Training
	04.1	Bladder Instillation
05.		Body System Condition Care
	05.0	Cardiopulmonary
	05.1	Cardiovascular
	05.2	Endocrine
	05.3	Gastrointestinal
	05.4	Genitourinary
	05.5	Integumentary
	05.6	Musculoskeletal
	05.7	Neurological
	05.8	Psychological
	05.9	Other Body System Condition
06.		Bowel Care
	06.0	Bowel Training
	06.1	Enema
	06.2	Disimpaction

07.		Catheter Care	
	07.0		Catheter Insertion
	07.1		Catheter Irrigation
08.		Chemotherapy Care	
09.		Communication Care	
10.		Community Services	
	10.0		Adult Day Care
	10.1		Hospice Care
	10.2		Meals on Wheels
	10.3		Other Community Service
11.		Compliance Analysis	
	11.0		Diet/Fluids
	11.1		Medical Regime
	11.2		Medications
	11.3		Safety
	11.4		Treatment Modality
12.		Counseling Services	
	12.0		Coping
	12.1		Stress Control
13.		Decubitus Care	
	13.0		Stage 1
	13.1		Stage 2
	13.2		Stage 3
	13.3		Stage 4
14.		Diabetic Care	
	14.0		Finger Stick
	14.1		Insulin Administration
	14.2		Prefill Insulin
	14.3		Reaction Control
15.		Dialysis Care	
16.		Ear Care	
	16.0		Hearing Aid Control
	16.1		Wax Removal
17.		Edema Control	
18.		Emergency Care	
19.		Emotional Support	
	19.0		Spiritual Comfort
20.		Eye Care	
	20.0		Cataract Care

21. Fluid Therapy
    - 21.0 Hydration Status
    - 21.1 Intake/ Output

22. Foot Care

23. Fracture Care
    - 23.0 Cast Care
    - 23.1 Immobilizer

24. Gastrostomy/Nasogastric Tube Care
    - 24.0 Tube Insertion
    - 24.1 Tube Irrigation

25. Infection Control
    - 25.0 Universal Precautions

26. Infusion Care
    - 26.0 Intravenous
    - 26.1 Venous Catheter Care

27. Injection Administration
    - 27.0 Vitamin B12

28. Medication Administration
    - 28.0 Actions
    - 28.1 Prefill Preparation
    - 28.2 Side Effects

29. Mental Health Care
    - 29.0 Mental Health History
    - 29.1 Mental Health Promotion
    - 29.2 Mental Health Screening
    - 29.3 Mental Health Treatment Modality
    - 29.4 Violence Control

30. Mobility Therapy
    - 30.0 Ambulation
    - 30.1 Assistive Device
    - 30.2 Prosthetic Training
    - 30.3 Transfer

31. Mouth Care
    - 31.0 Dentures

32. Nursing Contact
    - 32.0 Bill of Rights
    - 32.1 Care Coordination
    - 32.2 RN Status Report

33. Nutrition Care
    - 33.0 Enteral/ Parenteral Feeding
    - 33.1 Feeding Technique
    - 33.2 Regular Diet
    - 33.3 Special Diet

34. Ostomy Care
    - 34.0 Irrigation

35. Oxygen Therapy Care

36. Pacemaker Care

37. Pain Control
    - 37.0 Comfort Care

38. Perineal Care

39. Personal Care
    - 39.0 ADLs
    - 39.1 Bedbound Care
    - 39.2 IADLs

40. Physical Health Care
    - 40.0 Examination
    - 40.1 Health Promotion
    - 40.2 History
    - 40.3 Measurements
    - 40.4 Specimen Analysis

41. Physican Contact
    - 41.0 Medical Regime
    - 41.1 MD Status Report

42. Professional/Ancillary Service
    - 42.0 Home Health Aide
    - 42.1 Medical Social Worker
    - 42.2 Nurse Specialist
    - 42.3 Occupational Therapist
    - 42.4 Physical Therapist
    - 42.5 Speech Therapist
    - 42.6 Other Caregiver
    - 42.7 Other Professional

43. Psychosocial Analysis
    - 43.0 Home Situation
    - 43.1 Interpersonal Dynamics

44. Radiation Therapy Care

Appendix 6.1B Nursing Intervention
Scheme

Georgetown University

School of Nursing

Home Health Care Classification Project

NURSING DIAGNOSES CLASSIFICATION SCHEME

February 27, 1990

- 950 Activity, Altered
  - 950.0 Activity Intolerance
  - 950.1 Activity Intolerance: Risk
  - 950.2 Diversional Activity Deficit
  - 950.3 Fatigue/ Tired
  - 950.4 Physical Mobility, Impaired
  - 950.5 Sleep Pattern Disturbance

- 930 Anxiety

- 951 Bathing/Hygiene Deficit

- 920 Bowel Elimination, Altered
  - 920.0 Bowel Incontinence
  - 920.1 Constipation: Colonic
  - 920.2 Constipation: Perceived
  - 920.3 Diarrhea
  - 920.4 * Constipation: Unspecified
  - 920.5 * Fecal Impaction

- 921 Cardiac Output, Altered

- 931 Comfort, Altered
  - 931.0 Pain, Acute
  - 931.1 Pain, Chronic
  - 931.2 * Pain Unspecified

- 910 Communication, Impaired
  - 910.0 Verbal

- 952 Dressing/Grooming Deficit

- 936 Dying Process

- 900 Family Coping, Impaired
  - 900.0 Compromised
  - 900.1 Disabled

- 970 Family Processes, Altered

932	Fear	
953	Feeding Deficit	
	953.0	Breastfeeding, Impaired
	953.1	Swallowing, Impaired
922	Fluid Volume, Altered	
	922.0	Deficit
	922.1	Deficit: Risk
	922.2	Excess
	922.3	* Excess: Risk
933	Grieving	
	933.0	Anticipatory
	933.1	Dysfunctional
954	Growth and Development, Altered	
955	Health Maintenance, Altered	
901	Health Seeking Behavior	
956	Home Maintenance Management, Impaired	
902	Individual Coping, Impaired	
	902.0	Adjustment, Impaired
	902.1	Conflict: Decisional
	902.2	Coping: Defensive
	902.3	Denial, Impaired
923	Injury: Risk	
	923.0	Aspiration
	923.1	Disuse Syndrome
	923.2	Poisoning
	923.3	Suffocation
	923.4	Trauma
940	Knowledge Deficit	
	940.0	* Care Management
	940.1	* Diagnostic (Laboratory Tests)
	940.2	* Diet/ Fluids
	940.3	* Disease Processes
	940.4	* Medications
	940.5	* Medical Orders
	940.6	* Safety Precautions
	940.7	* Interventions
960	Meaningfulness, Altered	
	960.0	Hopelessness
	960.1	Powerlessness

- 943 * Medication: Risk

- 903 Noncompliance
  - 903.0 * Care Management
  - 903.1 * Diet/ Fluids
  - 903.2 * Medications
  - 903.3 * Medical Orders
  - 903.4 * Safety Precautions
  - 903.5 * Interventions

- 924 Nutrition, Altered
  - 924.0 Less than Body Requirement
  - 924.1 More than Body Requirement
  - 924.2 More than Body Requirements: Risk

- 925 Physical Regulation, Altered
  - 925.0 Dysreflexia
  - 925.1 Hyperthermia
  - 925.2 Hypothermia
  - 925.3 Thermoregulation, Impaired
  - 925.4 * Infection: Risk
  - 925.5 * Infection: Unspecified

- 934 Post-Trauma Response
  - 934.0 Rape Trauma Syndrome
  - 934.1 Rape Trauma Syndrome: Compound Reaction
  - 934.2 Rape Trauma Syndrome: Silent Reaction

- 926 Respiration, Altered
  - 926.0 Airway Clearance, Impaired
  - 926.1 Breathing Pattern, Impaired
  - 926.2 Gas Exchange, Impaired

- 971 Role Performance, Altered
  - 971.0 Parental Role Conflict
  - 971.1 Parenting, Altered
  - 971.2 Parenting, Altered: Risk
  - 971.3 Sexual Dysfunction

- 958 * Self Care Deficit
  - 958.0 * ADLs: Total
  - 958.1 * IADls: Total

- 961 Self Concept, Altered
  - 961.0 Body Image Disturbance
  - 961.1 Personal Identity Disturbance
  - 961.2 Self-Esteem Disturbance: Chronic Low
  - 961.3 Self-Esteem Disturbance: Situational

962	Sensory Perception, Altered
962.0	Auditory
962.1	Gustatory
962.2	Kinesthetic
962.3	Olfactory
962.4	Tactile
962.5	Visual
962.6	Unilateral Neglect
972	Sexuality Patterns, Altered
973	Socialization, Altered
973.0	Social Interaction, Impaired
973.1	Social Isolation
980	Spiritual State, Altered
980.0	Spiritual Distress
927	Tissue Integrity, Altered
927.0	Oral Mucous Membranes, Impaired
927.1	Skin Integrity, Impaired
927.2	Skin Integrity, Impaired: Risk
927.3	Skin Integrity: Invasive
928	Tissue Perfusion, Altered
928.0	Cardiopulmonary
928.1	Cerebral
928.2	Gastrointestinal
928.3	Peripheral
928.4	Renal
928.5	Endocrine
928.6	Immunological
928.7	Musculoskeletal
928.8	Other Body System Condition
941	Thought Processes, Altered
957	Toileting Deficit
929	Urinary Elimination, Altered
929.0	Incontinence: Functional
929.1	Incontinence: Reflex
929.2	Incontinence: Stress
929.3	Incontinence: Urge
929.4	Incontinence: Total (Unspecified)
929.5	Retention
935	Violence: Risk

*Non-NANDA Diagnoses

2nd Digit Categories

0 = Choosing

1 = Communicating

2 = Exchanging

3 = Feeling

4 = Knowing

5 = Moving

6 = Perceiving

7 = Relating

8 = Value

Home Health Care Classification Project

RULES FOR CODING PROCEDURES & NURSING DIAGNOSES
June 20, 1989

GENERAL RULES:

1. ENTER EACH CODE for PROCEDURES/ DIAGNOSES on a numbered line.

2. **CODE ALL** unique **PROCEDURES/ NURSING DIAGNOSES** as separate DATA ELEMENTS.

3. CODE most precise PROCEDURE/ NURSING DIAGNOSIS; however:

    a. If combinations of General and Precise PROCEDURE/ NURSING DIAGNOSIS Data Elements are noted together--**CODE** ONE General Data Element.

4. When **"AND"** is noted with two different **PROCEDURES/ NURSING DIAGNOSES--CODE** as two Data Elements; however if it is same CODE for PROCEDURE/DIAGNOSIS--SEE RULES for Each Section.

5. When **"OR"** is noted with PROCEDURE/NURSING DIAGNOSIS**--CODE ONLY one DATA ELEMENT.**

6. When a **Body System** is noted that reflects two separate body systems i.e. neuromuscular except cardiopulmonary, **CODE** as two separate body systems.

PROCEDURE RULES:

1. **DO NOT CODE** visit time Orders.

2. **CODE All Standing/ PRN Orders** as an actual Procedure.

3. If a PROCEDURE is noted without an Action--**CODE the IMPLIED ACTION using the following rules:**

    a. If it is a Procedure/ Order--**CODE as Direct Care.**

    b. If it is a Professional Person--**CODE either COMMUNICATE to/ OR REFER to.**

    c. If it is an Instruction--**CODE as Teach.**

    d. If it is a new Term--**CONSIDER it a PROBLEM for REVIEW.**

    e. If Unknown Action--**CODE as Unspecified.**

4. If a String, Multiple Versions or "AND" are noted for same Procedure--CODE as ONE unique General Data Element; However:

    a. If Different Procedure is noted that has same Data Element code and the Multiple String--CODE Each as more precise UNIQUE Data Element.

5. If TWO ACTIONS are noted with ONE procedure--**CODE TWO UNIQUE Data Elements.**

    Example: Teach S/Ss of Healing to Report to MD:

    CODE Teach S/Ss--5.58 & Report to MD--5.49

6. If TWO ACTIONS are noted with combinations of procedures CODE each ACTION as a unique Data Element.

7. If Sign or Symptom is noted without reference to a specific disease (Except Edema, Infection and Pain)--**CODE** using Sign & Symptom Code; however:

   a. If it is noted with a specific disease--**CODE** using appropriate body system, i.e. cough due to Bronchitis--CODE as Respiratory System.

8. If an ACTION is noted with a Nursing Diagnosis Descriptor--CODE **as a PROCEDURE** for appropriate "Body System".

   a. Example: Assess Altered CV Status--**CODE Assess** Body System (Cardiovascular).

9. If a **True** Nursing Diagnosis is noted as a PROCEDURE--CONSIDER it as a Problem for Review.

SPECIAL CODES

1. If "Elimination" is noted--**CODE** as a Bowel.
2. If "Physical Therapy" is noted CONSIDER as a Problem.

DO NOT CODE Physical Therapy Procedures performed by PT.

3. If Combinations of "Vital Signs" are noted--**CODE** as General Vital Signs.
4. If "Med(s)" is noted--CODE as Medication.
5. If "Report to" is "unspecified"--CODE as Physician Contact.
6. If "Incontinence" noted--CODE as Bladder.

NURSING DIAGNOSES RULES:

1. CODE ALL NURSING DIAGNOSES USING ONE LINE FOR EACH UNIQUE DATA ELEMENT.

2. If Multiple Versions of the SAME NURSING DIAGNOSIS is noted for different "Due To's" CONSIDER as PROBLEM. The Nursing Diagnosis Classification will be expanded to making it a Unique Data Element: however,

    a. If Multiple Versions still are noted EACH one will be CODED if a "Discharge Status" is also Noted.

3. If "due to" is noted--CODE the most Precise Data Element.

4. If "Potential" is noted with a Nursing Diagnosis--CODE as "Risk". However, If RISK is NOT listed--CODE General Data Element.

5. DO NOT CODE Medical Diagnoses.

6. If a Medical Diagnosis is noted with a Nursing Diagnosis Descriptor--CODE with Prefix 7 using appropriate Body System.

    a. Example: If Diabetes Mellitus is noted--CODE as - 7 - Medical Diagnosis using Body System. If Altered Diabetes Mellitus is noted-- CODE as - 8 - Altered Endocrine Body System.

7. If a Procedure is noted in NURSING DIAGNOSIS Section-- CODE according to most precise body system.

8. USE Prefix 8 for Patient Problems and other terms that are not NANDA Nursing Diagnosis for Data Elements.

9. USE Prefix 6 using appropriate Body System for Knowledge Deficit of a Specific Body System and/or Disease Process.

SPECIAL CODES

1. If "Urinary Incontinence" is noted--**CODE** as "Incontinence: Total".
2. If "Wound Infection" is noted--**CODE** as "Infection: Risk"--925.4.
3. If "Allergic Reaction" is noted--**CODE** as "Allergic Response (Non-Drug Related)"--923.5
4. If "Alteration in Intake and Output" is noted--**CODE** as "Altered Fluid Volume--922.

TREATMENT CODES FOR PROFESSIONAL SERVICES REQUIRED

Skilled Nursing

A1	Skilled Observation (Inc. V.S., Response to Med., etc.)
A2	Foley Insertion
A3	Bladder Instillation
A4	Wound Care/Dressing
A5	Decubitus Care
A6	Venipuncture
A7	Restorative Nursing
A8	Post Cataract Care
A9	Bowel/Bladder Training
A10	Chest Physio (Inc. Postural drainage)
A11	Adm. of Vitamin B/12
A12	Prep/Adm. Insulin
A13	Adm. Other IM/Subq.
A14	Adm. IV's/Clysis
A15	Teach. Ostomy or Ileo conduit care
A16	Teach. Nasogastric Feeding
A17	Reinsertion Nasogastric Feeding Tube
A18	Teach. Gastrostomy Feeding
A19	Teach Parenteral Nutrition
A20	Teach. Care of Trach
A21	Adm. Care of Trach
A22	Teach. Inhalation Rx
A23	Adm. Inhalation Rx
A24	Teach. Adm. of Injection
A25	Teach. Diabetic Care
A26	Disimpaction/F.U. Enema
A27	Other (Spec. under Orders)

Physical Therapy

B1	Evaluation
B2	Therapeutic Exercise
B3	Transfer Training
B4	Estab. Maintenance Prog.
B5	Gait Training
B6	Chest Physiotherapy
B7	Ultra Sound
B8	Proprioceptive Neuromuscular Facilitation
B9	Passive Exercises
B10	Active Exercises
B11	Resistive Exercises
B12	Stretching Exercises
B13	Prosthetic Training
B14	Whirlpool
B15	Other (Spec. Under Orders)

Speech Therapy

C1	Evaluation
C2	Alaryngeal Speech
C3	Lang. Processing
C4	Speech/Voice
C5	Comprehensive
C6	Aural Rehab.
C7	Other (Spec. under Orders)

Occupational Therapy

D1	Evaluation
D2	ADL Training
D3	Muscle Re-education
D4	Other (Spec. under Orders)

Medical Social Services

E1	Assessment of Social and Emotional Factors
E2	Counseling
E3	Financial Assistance
E4	Placement Assistance
E5	Arrange for Meals
E6	Other (Spec. under Orders)

Home Health Aide

F1	Tub/Shower Bath
F2	Partial Bed Bath
F3	Complete Bed Bath
F4	Shave
F5	Comb Hair
F6	Catheter Care
F7	Change Linen
F8	Assist with Ambulation
F9	Transfer Bed/Chair
F10	Exercises
F11	Prepare Meal
F12	Grocery Shop
F13	Wash Clothes
F14	Housekeeping
F15	Other (Spec. under Orders)

6. DATA PROCESSING

Appendix 6.2 ....Omitted

6.2 Names and Addresses of 646 Participating Agencies

6. DATA PROCESSING

Appendix 6.3' ......Omitted

6.3 Data Tape Documentation

LIST OF TABLES

8. DESCRIPTIVE FINDINGS .... 83 - 148

8.1 Comparison of national sample agencies with HCFA Medicare certified HHAs: Staff size

8.2 Comparison of national sample agencies with HCFA Medicare certified HHAs: Type of ownership

8.3 Comparison of national sample agencies with HCFA Medicare certified HHAs: Four regions

8.4 Frequency distributions of national sample home health agencies: State

8.5 Comparison of national sample agencies with HCFA certified HHAs: States and regions

8.6 Comparison of the sample cases with the national sample HHAs: Staff size

8.7 Comparison of the sample cases with the national sample HHAs: Type of agency ownership

8.8 Comparison of the sample cases with the national sample HHAs: Four regions

8.9 Number and percent distribution of sample cases: State and region

8.10 Number and percent distributions of cases: Age groups

8.11 Number and percent distributions of cases: Marital status

8.12 Number and percent distributions of cases: Sex

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